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REPORT ON THE DEVELOPMENT OF THE MANNED ORBITAL RESEARCH LABORATORY (MORL) SYSTEM UTILIZATION POTENTIAL

TASK AREA II
INTEGRATED MISSION DEVELOPMENT PLAN

BOOK 3

[redacted]

SM-48812
OCTOBER 1965

MISSILE & SPACE SYSTEMS DIVISION
DOUGLAS AIRCRAFT COMPANY, INC.
SANTA MONICA/CALIFORNIA

DOUGLAS

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REPORT ON THE DEVELOPMENT OF THE MANNED ORBITAL RESEARCH LABORATORY (MORL) SYSTEM UTILIZATION POTENTIAL

Task Area II
Integrated Mission Development Plan

BOOK 3

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PRESENTED TO
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
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The Manned Orbital Research Laboratory (MORL) is a versatile facility for experimental research which provides for:

- Simultaneous development of space flight technology and man's capability to function effectively under the combined stresses of the space environment for long periods of time.

- Intelligent selectivity in the mode of acquisition, collation, and transmission of data for subsequent detailed scientific analyses.

- Continual celestial and terrestrial observations.

Future application potential includes use of the MORL as a basic, independent module, which, in combination with the Saturn Launch Vehicles currently planned for the NASA inventory, is responsive to a broad range of advanced mission requirements.

The laboratory module includes two independently pressurized compartments connected by an airlock. The larger compartment comprises the following functional spaces:

- A Control Deck from which laboratory operations and a major portion of the experiment program will be conducted.
- An Internal Centrifuge in which members of the flight crew will perform re-entry simulation, undergo physical condition testing, and which may be useful for therapy, if required.
- The Flight Crew Quarters, which include sleeping, eating, recreation, hygiene, and liquids laboratory facilities.

The smaller compartment is a Hangar/Test Area which is used for logistics spacecraft maintenance, cargo transfer, experimentation, satellite checkout, and flight crew habitation in a deferred-emergency mode of operation.

The logistics vehicle is composed of the following elements:

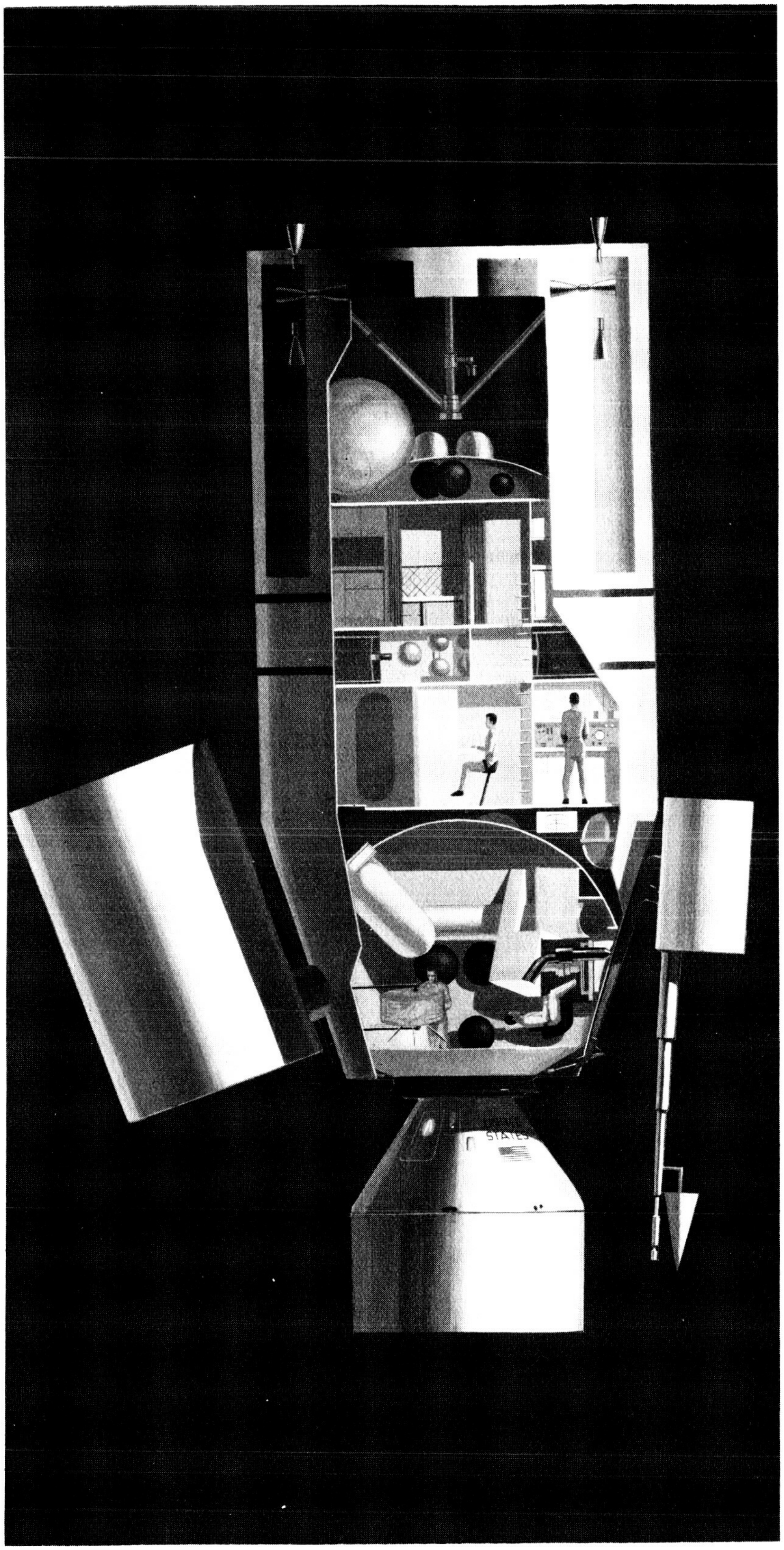
- A Logistics Spacecraft which generally corresponds to the geometric envelope of the Apollo Command and Service Modules and which includes an Apollo Spacecraft with launch escape system and a service pack for rendezvous and re-entry maneuver propulsion; and a Multi-Mission Module for either cargo, experiments, laboratory facility modifications, or a spacecraft excursion propulsion system.
- A Saturn IB Launch Vehicle.

Integration of this Logistics System with MORL ensures the flexibility and growth potential required for continued utility of the laboratory during a dynamic experiment program.

In addition to the requirements imposed by the experiment program, system design parameters must reflect operational requirements for each phase of the mission to ensure:

- Functional adequacy of the laboratory.
- Maximum utilization of available facilities.
- Identification of important parameters for consideration in future planning of operations support.

For this reason, a concept of operations was developed simultaneously with development of the MORL system.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PREFACE

This report is submitted by the Douglas Aircraft Company, Inc., to the National Aeronautics and Space Administration's Langley Research Center. It has been prepared under Contract No. NAS1-3612 and describes the analytical and experimental results of a preliminary assessment of the MORL's utilization potential.

Documentation of study results are contained in two types of reports: a final report consisting of a Technical Summary and a 20-page Summary Report, and five Task Area reports, each relating to one of the five major task assignments. The final report will be completed at the end of the study, while the Task Area reports are generated incrementally after each major task assignment is completed.

The five Task Area reports consist of the following: Task Area I, Analysis of Space Related Objectives; Task Area II, Integrated Mission Development Plan; Task Area III, MORL Concept Responsiveness Analysis; Task Area IV, MORL System Improvement Study; and Task Area V, Program Planning and Economic Analysis.

This document contains 1 of 3 parts of the Task Area II report, Integrated Mission Development Plan. The contents and identification of these parts are as follows: Book 1, Douglas Report SM-48810, contains the discussion and analyses of the subject matter and Books 2 and 3, Douglas Reports SM-48811 and SM-48812, contain the Applications Plan Task Descriptions.

Requests for further information concerning this report will be welcomed by R. J. Gunkel, Director, Advance Manned Spacecraft Systems, Advance Systems and Technology, Missile & Space Systems Division.

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CONTENTS

INTRODUCTION

This document is a continuation of Book No. 2 and presents Application Plan Task Descriptions No. 700 through 915.

Douglas Aircraft Company, Inc., Report No. MORL 65-1, MORL Applications Plan for Oceanography and Meteorology, dated August 1965, identifies tasks to be accomplished on board a manned orbital research laboratory. Each task shown on the plan is coded by reference number to Task Description Sheets in these documents. Copies of this plan can be obtained upon request from the MORL Studies Office at NASA, Langley Research Center.

APPLICATION PLAN TASK DESCRIPTION SHEETS

Each task description includes the following:

- A brief description of the task to be accomplished on board a manned orbital research laboratory.
- A brief justification for the task.
- Task parameter sheets listing the time-dependent resources required to perform the task and other data pertinent to a computerized experiment scheduling program. (Task parameter definitions are given below.)

Some tasks have two parameter sheets--one describing the experiment and the other the installation of the task's experimental equipment or instruments. These setup tasks are identified by a three- or four-digit number beginning with 1; e.g., Task No. 101 is the setup for Task No. 1.

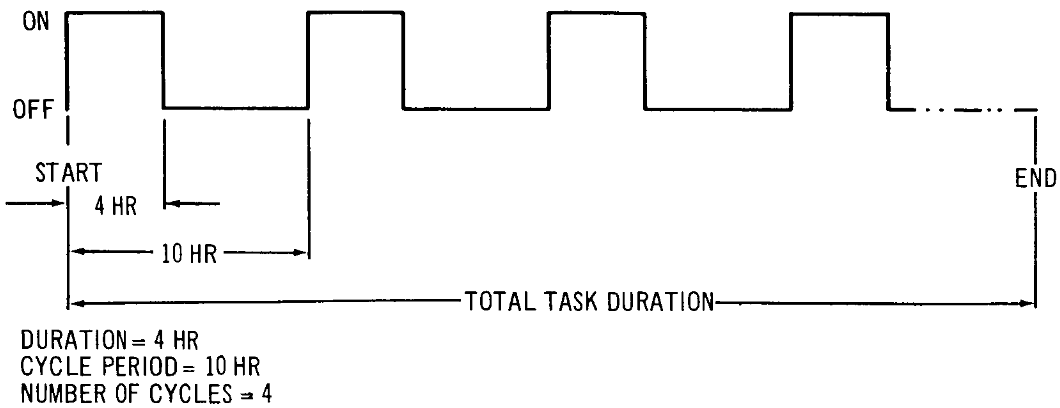
Experiment parameters for Application Plan tasks are defined as follows:

1. Task Number--Identifies the Application Plan task for which the following data are required as an input to a laboratory simulation program (which includes experiment scheduling).
2. Interruptible--If a task is interrupted because of a failure, this input defines whether the task must be started all over again or whether it can be resumed from the point at which it was stopped.

3. Duration (On-time/cycle)--States the time required to complete the active portion of the task (see following example).

4. Cycle Period--Gives the time from the beginning of one cycle to the start of the next (see following example). Cycle Period equals Duration for noncyclic tasks.

5. Number of Cycles Required--States the total number of cycles required to complete the task (see the following example).



6. Predecessor Task Number--Identifies the task whose completion leads directly to the subject experiment.

7. Successor Task Number and Initial Lag Time--Identifies those tasks that are immediate successors to the task being defined and lists the minimum required time delay between the end of the subject task and the first attempt to start its immediate successors.

8. Manpower--States the average manpower required during each cycle duration. Increments of whole men are used; that is, 1 man for 0.1 hour, rather than 0.1 man for 1 hour (a situation that could arise from only partial attention being required by a test over a long period).

   The total hours that men are required for each cycle must be less than, or equal to, cycle duration. If the hours required per man each cycle are less than the cycle's duration, time is given from the start of the cycle to when men are first required. This is explained in the following example:

Duration = 4 hours

Manpower = 2 men--2.5 hours

1.5 hours from start of cycle

This input says that two men are required for the last 2 1/2 hours of each 4-hour cycle.

9. Electrical Power--States the average electrical power required for each cycle duration.

   If electrical power is required for less than the cycle's duration, then the time is given from the start of the cycle to when power is first required.

10. Shipping Weight--Lists the equipment weight (including a crating allowance) for the task.

11. Shipping Volume--Lists the equipment volume in its "as shipped" condition. The external dimensions of the shipping crates are used.

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T NO. 700 TITLE System Integration Test--Wide-Band Visible Radiometer

LEVEL System Integration Tests

DESCRIPTION

1. Install radiometer on gimballed mount in normal operating position. Attach all electrical connectors. Checkout mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility.

2. Perform functional test by electrically energizing the radiometer and rotating the instrument between all gimballed limits. Point the radiometer straight down, and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits. Observe output instruments for each radiometer channel for output readings within the expected range of values.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory, including transmitters, tape recorders, centrifuge, motors, pumps, etc.; ensure that the radiometer output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL laboratory to ensure that no undesirable response results from operation of the radiometer.

4. Align and boresight the radiometer to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal-angle readings between the instrument and the reference visual standard.

5. Calibrate the two channels of the radiometer. This involves pointing the radiometer toward a calibration-temperature source located aboard the laboratory which has been adjusted and stabilized. The radiometer output is adjusted, if necessary, to the correct reading. Calibration and adjustment may be required at more than one temperature within the expected range of instrument operation.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include radiometer readings, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure.

JUSTIFICATION

The system integration tests are conducted primarily to check the compatibility of the individual instruments with the MORL laboratory. These tests are not intended to test the instruments for the performance requirements of an experiment in meteorological events. These tests are mainly to determine (1) that the instruments can be mechanically installed on their mounts, (2) that they optically align with their antennas, and (3) that their electrical connectors fit properly and that the wires are not broken. Also, that any manual controls or instruments are properly interconnected with the instruments. Electromagnetic compatibility tests are required to make certain that radiations from an instrument do not affect another.

As instruments are installed, they must be boresighted and calibrated. These instruments must be connected with the digital recording equipment, or any other data recording equipment, and assurance given that the outputs of the instruments are being properly recorded. For instance, detectors which look at the ground may be pointed to the ground but at no specific target to determine that the signal is being received, that the meters respond, and that the data is being recorded on the tape. It is simply a check of compatibility with the laboratory. Equipment which is externally mounted must be moved to the limits of its gimballed mount to make certain that one instrument does not interfere with another instrument that may be used simultaneously. The field of view of the instruments must not be obscured by another instrument or antenna.

Because each of these instruments will have its own particular requirements peculiarities, pointing angles, pointing directions and voltage levels, etc., each one must be considered an individual task. Each individual instrument must be considered strictly by itself. After the individual instruments are functioning properly, the instruments which may have to operate simultaneously must be checked as a group to ensure that there is no mutual obstruction or mutual interference. It is therefore important to recognize that, although the wording of Task Card 700 applies to all tasks through 723, all the tasks are unique; minor variation will be observed from one to the other depending upon the requirements for the specific individual instruments. At this time, these tests cannot be detailed because the individual requirements of each instrument are not clear.

Whether or not specific instruments will finally be used operationally is not known; these are candidate instruments. The specific integration test which will be required will depend to a large extend upon the actual design of the instrument which is taken aboard, and upon the amount of integration testing which can be performed on the ground prior to launch. The actual design of the instruments and their placement on the laboratory may well determine whether some of these tests will even be necessary. For example, if an instrument is mounted in a location that it is obviously clear of all obstructions, there is no need to test for interference. Likewise, if an instrument is installed on the ground and aligned and boresighted in a specific direction and will never be removed from its mount during the life of the laboratory, there may be no need to reboresight and realign it. If the electrical connectors were checked out prior to launch, the only check in flight is to connect the instrument, make sure that no wires have been broken, and that the instrument is operational. Therefore, many of these tests may be simple and redundant. On the other hand, others may be complex depending upon unforeseen changes that may develop in the future.

TASK PARAMETERS

NO. 1700 TITLE Install Visible Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. 72, 603, 604, 608, 619

SUCCESSOR TASK NO. AND INITIAL LAG TIME 700, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 70 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 55 LB SHIPPING VOLUME 3.7 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test and Installation Equipment
21	Visible Radiometer

NO. 700 TITLE System Integration -- Wide-Band Visible Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1700

SUCCESSOR TASK NO. AND INITIAL LAG TIME 758, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 70 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1700)

EQUIPMENT REQUIRED

ID	NAME
21	Visible Radiometer

TASK NO. 703 TITLE Systems Integration Tests--Dual-Channel Visible Radiometer

LEVEL System Integration Test

DESCRIPTION

1. Install dual-channel visible radiometer on gimballed mount in its normal operating position. Attach all electrical connectors. Checkout mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform functional test by electrically energizing the radiometer and rotating the instrument between all gimballed limits. Point the radiometer straight down, and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits. Observe output instruments for each radiometer channel for output readings within the expected range of values.

3. Perform an electromagnetic compatibility test by operating various laboratory equipment, including transmitters, tape recorders, centrifuge, motors, pumps, etc., and noting that the radiometer output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL laboratory to ensure that no undesirable response results from operating the radiometer.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the radiometer and the reference visual standard.

5. Calibrate both channels of the dual-channel visible radiometer. This involves pointing the radiometer toward a calibration temperature source located aboard the laboratory which has been adjusted and stabilized at a suitable calibration temperature. The instrument output is adjusted, if necessary, to the correct reading. Calibration and adjustment may be required at more than one temperature within the expected range of instrument operation.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include radiometer readings, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1703 TITLE Install Dual-Channel Visible Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. 72, 603, 604, 608, 619

SUCCESSOR TASK NO. AND INITIAL LAG TIME 703, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 100 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 55 LB SHIPPING VOLUME 3.7 FT^3

EQUIPMENT REQUIRED

ID	NAME
21	Visible Radiometer

NO. 703 TITLE System Integration--Dual-Channel Visible Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1703

SUCCESSOR TASK NO. AND INITIAL LAG TIME 753, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 75 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1703)

EQUIPMENT REQUIRED

ID	NAME
21	Visible Radiometer

TASK NO. 704 TITLE Systems Integration Tests--Infared Spectrometer

LEVEL System Integration Test

DESCRIPTION

1. Install IR spectrometer on gimballed mount in its normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform functional test by electrically energizing the spectrometer and rotating the instrument between all gimballed limits. Point the spectrometer straight down, and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits. Observe output instruments for each spectrometer channel for output readings within the expected range of values.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory, including transmitters, tape recorders, centrifuge, motors, pumps, etc., and noting that the spectrometer output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL to ensure that no undesirable response results from operating the spectrometer.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the spectrometer and the reference visual standard.

5. Calibrate the IR spectrometer at several frequencies within the spectrometer range. This involves pointing the spectrometer toward a calibration temperature source located aboard the laboratory which has been adjusted and stabilized at a suitable calibration temperature. The instrument output is adjusted, if necessary, to the correct reading. Calibration and adjustment may be required at more than one temperature within the expected range of instrument operation.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include spectrometer readings, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1704 TITLE Install IR Spectrometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 601, 604, 608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 704, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 100 W 2.5 HR/CYCLE

1.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 100 LB SHIPPING VOLUME 5.6 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	IR Spectrometer

NO. 704 TITLE System Integration--IR Spectrometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1704

SUCCESSOR TASK NO. AND INITIAL LAG TIME 754, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 75 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1704)

EQUIPMENT REQUIRED

ID	NAME
-	IR Spectrometer

TASK NO. 705 TITLE Systems Integration Tests--Dual-Channel Ultraviolet Radiometer

LEVEL System Integration Test

DESCRIPTION

1. Install dual-channel UV radiometer on gimballed mount in its normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform functional test by electrically energizing the radiometer and rotating the instrument between all gimballed limits. Point the radiometer toward the sun, and rotate the laboratory a few degrees in each plane to check functioning of the pointing directions stabilization circuits. Observe output instruments for each radiometer channel for output readings within the expected range of values.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory, including transmitters, tape recorders, centrifuge, motors, pumps, etc., and noting that the radiometer output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL to ensure that no undesirable response results from operating the radiometer.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the radiometer and the reference visual standard.

5. Calibrate both channels of the dual-channel UV radiometer. This involves pointing the radiometer toward a calibration temperature source located aboard the laboratory which has been adjusted and stabilized at a suitable calibration temperature. The instrument output is adjusted, if necessary, to the correct reading. Calibration and adjustment may be required at more than one temperature within the expected range of instrument operation.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include radiometer readings, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1705 TITLE Install Dual-Channel UV Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. 72, 601, 604, 608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 705, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 100 W 2.5 HR/CYCLE

1.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 55 LB SHIPPING VOLUME 2.3 FT^3

EQUIPMENT REQUIRED

ID	NAME
16	UV Radiometer

NO. 705 TITLE System Integration--Dual-Channel UV Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1705

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 75 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1705)

EQUIPMENT REQUIRED

ID	NAME
16	UV Radiometer

TASK NO. 710 TITLE Systems Integration Tests--Visible Polarimeter

LEVEL System Integration Test

DESCRIPTION

1. Install visible polarimeter on gimballed mount in its normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform functional test by electrically energizing the instrument and rotating the instrument between all gimballed limits. Point the instrument straight down, and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory, including transmitters, tape recorders, centrifuge, motors, pumps, etc., and noting that the instrument output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL to ensure that no undesirable response results from operating the polarimeter.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the instrument and the reference visual standard.

5. Calibrate the polarimeter which involves aiming the instrument toward a polarized light source aboard the laboratory whose polarization angle may be adjusted. For different settings of the polarizer on the light source, adjust the polarimeter analyzer to determine that the correct readings of polarization angle and degree of polarization are obtained. This calibration check may be made using a suitable test jig within the laboratory before the instrument is mounted in its normal operating position.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include polarization angle and degrees of polarization, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure. This run should be made by aiming the instrument at a series of cloud tops which most likely will contain ice crystals as a suitable polarized light source.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1710 TITLE Install Visible Polarimeter

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 604, 608, 619

SUCCESSOR TASK NO. AND INITIAL LAG TIME 710, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 2 FT^3

EQUIPMENT REQUIRED

ID	NAME
23	Visible Polarimeter

NO. 710 TITLE System Integration--Visible Polarimeter

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 13 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1710

SUCCESSOR TASK NO. AND INITIAL LAG TIME 760, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 75 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3
(See 1710)

EQUIPMENT REQUIRED

ID	NAME
23	Visible Polarimeter

TASK NO. 711 TITLE Systems Integration Tests-- Ultraviolet Spectrometer

LEVEL System Integration Test

DESCRIPTION

1. Install UV spectrometer on gimballed mount in its normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform functional test by electrically energizing the spectrometer and rotating the instrument between all gimballed limits. Point the spectrometer straight down, and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits. Observe output instruments for each spectrometer channel for output readings within the expected range of values.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory, including transmitters, tape recorders, centrifuge, motors, pumps, etc., and noting that the spectrometer output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL to ensure that no undesirable response results from operating the spectrometer.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the spectrometer and the reference visual standard.

5. Calibrate the UV spectrometer at several points within the UV spectrum. This involves pointing the spectrometer toward a calibration temperature source located aboard the laboratory which has been adjusted and stabilized at a suitable calibration temperature. The instrument output is adjusted, if necessary, to the correct reading. Calibration and adjustment may be required at more than one temperature within the expected range of instrument operation.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include spectrometer readings, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1711 TITLE Install Ultraviolet Spectrometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 601, 604, 608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 711, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 40 LB SHIPPING VOLUME 3.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
20	UV Spectrometer

NO. 711 TITLE System Integration--Ultraviolet Spectrometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 13 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1711

SUCCESSOR TASK NO. AND INITIAL LAG TIME 761, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 75 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3
(See 1711)

EQUIPMENT REQUIRED

ID	NAME
20	UV Spectrometer

TASK NO. 713 TITLE Systems Integration Tests--Dual Star Tracker

LEVEL System Integration Test

DESCRIPTION

1. Install dual star tracker on a gimballed mount in normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment and accessibility for manual adjustment and maintenance purposes.

2. Perform a functional test by electrically energizing the star-tracker control system and rotating the instrument between all gimbal limits. Set both trackers to acquire and lock onto a common star target. Rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits. Observe the output instruments to indicate a single pointing direction for both systems.

3. Perform electromagnetic compatibility test by operating various equipments of the laboratory including transmitters, tape recorders, centrifuge, motors, pumps, etc. and note that the star tracker shows no undesirable response and that angle readings remain steady. Conversely, check other sensitive receivers and instruments on the MORL laboratory to ensure that no undesirable response results from the scanning or stabilization operations of the star tracker.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment, jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the star tracker and the reference visual standard.

5. Calibrate the angle measuring circuits of both trackers by first aiming at a common star target and moving the laboratory to various attitudes and then aiming each star tracker at different star targets having a known angular displacement.

6. Check compatibility with data handling system for proper recording of star tracker output readings, which will include pointing directions for both star trackers and laboratory position and time of measurement.

7. Validate operation procedure and techniques by performing a dummy run in which the star tracker acquisition program is used in the automatic mode to acquire and lock onto several successive pairs of stars in accordance with the predetermined operational procedure.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1713 TITLE Install Dual Star Tracker

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 604, 639, 640, 521

SUCCESSOR TASK NO. AND INITIAL LAG TIME 713, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 60 LB SHIPPING VOLUME 3 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Dual Star Tracker

NO. 713 TITLE Systems Integration--Dual Star Tracker

INTERRUPTIBLE Yes DURATION (HR) 7 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 22 NO. OF CYCLES 20

PREDECESSOR TASK NO. 1713

SUCCESSOR TASK NO. AND INITIAL LAG TIME 763, 336 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	3	4
1	66	3	4
1	71	3	4

ELECTRICAL POWER 75 W 7 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3
(See 1713)

EQUIPMENT REQUIRED

ID	NAME
-	Dual Star Tracker

TASK NO. 716 TITLE Systems Integration Tests--Infrared Interferometer and Multi-Slit/Multidetector Grating Infrared Spectrometer

LEVEL System Integration Test

DESCRIPTION

This systems integration test applies to an IR interferometer as the candidate instrument and to a multi-slit/multidectector grating IR spectrometer as an alternate instrument. This task description is written in terms of the candidate instrument.

1. Install the IR interferometer on gimballed mount in its normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform functional test by electrically energizing the IR interferometer and rotating the instrument between all gimballed limits. Point the IR interferometer straight down, and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits. Observe output instruments for the interferometer channel for output readings within the expected range of values.

3. Perform an electromagnetic compatibility test by operating various equipment of the laboratory, including transmitters, tape recorders, centrifuge, motors, pumps, etc. and noting that the interferometer output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL to ensure that no undesirable response results from operating the interferometer.

4. Align and boresight the instrument to the visual observation system of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the interferometer and the reference visual standard.

5. Calibrate the IR interferometer. This involves pointing the interferometer toward a calibration temperature source located aboard the laboratory which has been adjusted and stabilized at a suitable calibration temperature. The instrument output is adjusted, if necessary, to the correct reading. Calibration and adjustment may be required at more than one temperature within the expected range of instrument operation.

6. Check compatibility with data handling system for the proper recording of instrument outputs which include interferometer readings, gimbal readings, and laboratory position with time of measurement.

7. Validate operation procedure and techniques by performing a dummy run of a series of values in accordance with a predetermined operational test procedure.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1716 TITLE Intall IR Interferometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 601, 608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 716, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 1.7 FT^3

EQUIPMENT REQUIRED

ID	NAME
15	IR Interferometer

NO. 716 TITLE Systems Integration--IR Interferometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 13 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1716

SUCCESSOR TASK NO. AND INITIAL LAG TIME 766, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 75 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1716)

EQUIPMENT REQUIRED

ID	NAME
15	IR Interferometer

TASK NO. 718 TITLE Systems Integration Tests--High-Resolution Television System

LEVEL System Integration Test

DESCRIPTION

1. Install television camera and zoom lens system on suitable gimballed mount in normal operational position. Connect television receiver in its normal position within the laboratory. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform a functional test by energizing the television system, rotating the camera between all gimbal limits, and operating the zoom lens throughout its range. Aim the camera straight down and rotate the laboratory a few degrees in each plane to check the functioning and stability of the pointing direction stabilization circuits. Observe the television screen for picture clarity, contrast, and other visual factors for estimating its performance.

3. Perform an electromagnetic compatibility test by operating various equipment of the laboratory including transmitters, tape recorders, centrifuges, motors, pumps, etc., and noting that the television display shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL laboratory to ensure that operation of the television scanning system, camera gimbal system, or zoom lens create no undesirable response in other MORL systems.

4. Align and boresight the television camera and lens system to all visual observation systems of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the television camera and reference visual standards. Since the television camera system may be the primary visual system for the laboratory, proper alignment and tracking between its gimbal systems and other gimballed instruments must be ensured.

5. Point the television camera at various ground targets and determine that the gimbal system will maintain the camera pointing at that target, as the laboratory passes over. This should be done, not only for targets that are in the orbital plane and passing beneath the laboratory, but also for targets that are offset at specified angles.

6. Check compatibility with data handling system for the proper recording of television video output, gimbal readings, and laboratory position with time of measurement.

7. When other gimballed instruments are in use, check to ensure that their pointing direction and scanning limits are properly displayed on the television screen by appropriate position markers.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1718 TITLE Install Television

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 604, 608, 657, 659

SUCCESSOR TASK NO. AND INITIAL LAG TIME 718, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 100 LB SHIPPING VOLUME 6 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System

NO. 718 TITLE Systems Integration--Television

INTERRUPTIBLE Yes DURATION (HR) 6 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 14 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1718

SUCCESSOR TASK NO. AND INITIAL LAG TIME 768, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 130 W 6 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1718)

EQUIPMENT REQUIRED

ID	NAME
10	Television System

TASK NO. 719 TITLE System Integration--Infrared Camera

LEVEL Systems Integration Tests

DESCRIPTION

1. Install camera on gimballed mount in its normal operating position. Attach all electrical connectors. Check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for changing film, manual adjustment, and maintenance purposes.

2. Functionally check the electrical positioning system by rotating the camera to its gimbal limits. Point the camera straight down and rotate the laboratory a few degrees in each plane to check the functioning of the pointing direction stabilization circuits.

3. Perform an electromagnetic compatibility test by observing sensitive receivers and instruments on the MORL laboratory to assure that operating the camera gimbals causes no undesirable response. Only if the IR camera recording system employs an infrared detector that electronically produces a visible light picture for recording by the film will it be necessary to include a compatibility test. This test will be accomplished by operating other equipment in the laboratory to see that there is no undesirable response of the IR system; however, if film is used, this test is not necessary.

4. Align and boresight the camera to the visual observation system of the laboratory. This may require alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the instrument and the reference visual standard.

5. If the aperture and speed settings of the camera are electrically controlled, and the film transport system is also electrically controlled, these systems should be functionally operated within the limits of their adjustment to ensure normal operation.

6. Check compatibility with data handling system for proper recording of correlating camera outputs, such as gimbal readings, time of exposure, and laboratory position.

7. Validate operating procedure and techniques by exposing a few films of terrestrial targets or cloud covered targets in accordance with predetermined exposure and aperture setting data.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1719 TITLE Install IR Camera

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. 72, 601, 604, 608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 719, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 1.7 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	IR Camera

NO. 719 TITLE System Test of IR Camera

INTERRUPTIBLE Yes DURATION (HR) 7 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 13 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1719

SUCCESSOR TASK NO. AND INITIAL LAG TIME 769, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	2
1	71	4	2

ELECTRICAL POWER 75 W 7 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1719)

EQUIPMENT REQUIRED

ID	NAME
19	IR Camera

TASK NO. 721 TITLE Systems Integration Tests--Dual-Channel Television System

LEVEL System Integration Test

DESCRIPTION

1. Install the television camera on its gimballed mount in normal operating position. Install the camera system, electronics and recording system at its normal operating location within the laboratory. Attach all electric connectors, check out mechanical, optical, electrical, and manual interfaces for proper fit, freedom of movement, general alignment, and accessibility for manual adjustment and maintenance purposes.

2. Perform function test by electrically energizing the television system and rotating the camera between all gimballed limits. Point the instrument down, and rotate the laboratory a few degrees in each plane to check the functioning of the position direction stabilization circuits. Observe the visual display of each television channel for picture quality and contrast within the expected range of operation.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory, including transmitters, recorders, centrifuge, motors, pumps, etc., and noting that the television presentation shows no undesirable response. Conversely, check other sensitive receivers and instruments on the MORL laboratory to ensure that the television camera scanning electronics shows no undesirable response.

4. Align and boresight the television camera with other visual observation systems of the laboratory. This may involve alignment jigs, visual alignment to reference bench marks, and a comparison of gimbal angle readings between the instrument and the reference visual standard.

5. While flying over a clouded area, perform a calibration test on both television channels to ensure that the proper range of brightness is assured for each channel.

6. Check compatibility with data handling system for proper recording of the video outputs of each television channel, the instrument gimbal readings, and the laboratory position and time of measurement.

7. Validate operational procedures and techniques by exposing and recording pairs of television frames and noting that the electronic comparison circuits provide a recording of the different signals between adjacent pairs of frames within the expected range of values.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1721 TITLE Install Dual-Channel Television

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 72, 604, 608, 657, 659

SUCCESSOR TASK NO. AND INITIAL LAG TIME 721, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 100 LB SHIPPING VOLUME 6 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Dual-Channel Television System

NO. 721 TITLE Systems Integration Dual-Channel Television

INTERRUPTIBLE Yes DURATION (HR) 10 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 14 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1721

SUCCESSOR TASK NO. AND INITIAL LAG TIME 771, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 130 W 10 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1721)

EQUIPMENT REQUIRED

ID	NAME
-	Dual-Channel Television System

TASK NO. 723 TITLE System Integration Tests--Directional Sferics Receiver

LEVEL System Integration Test

DESCRIPTION

These tasks are performed on a directional sferics receiver which is used to count, measure the strength of, and locate atmospheric electrical discharges. Atmospherics indicate areas of strong vertical motion related to violent storm development.

1. Assemble antenna system on gimballed mount or normal operating position. Install radio receiver at its operating location within the laboratory. Attach all electrical connectors. Check out mechanical, electrical and manual interfaces for proper fit, freedom of motion, general alignment, and accessibility for manual adjustment and maintenance purposes. Because of size (~200 ft diam), the antenna assembly and mounting is a major task.

2. Perform functional test by electrically energizing the antenna servo control system and scanning control circuits to rotate the antenna between all gimballed limits. Point the antenna straight down and rotate the laboratory a few degrees in each plane to check functioning of the pointing direction stabilization circuits. Put the antenna in a scanning mode and, while the scanning operation progresses, note interaction with the laboratory stabilization system. With the antenna scanning in a downward direction, observe the receiver output on a suitable scope presentation and check for output readings within the expected range of values for target range and signal amplitude.

3. Perform an electromagnetic compatibility test by operating various equipments of the laboratory including transmitters, recorders, centrifuge, motors, pumps, etc. and noting that the receiver output shows no undesirable response. Conversely, check other sensitive receivers and instruments on the laboratory to ensure that no undesirable response results from the receiver operation. Align and boresight the antenna to the visual observation system of the laboratory. This may involve alignment changes, visual alignment to reference bench marks, and a comparison of gimbal readings between the antenna and the reference visual standard.

4. Using a suitable test set, determine that the receiver tuning and sensitivity figures are within the normal limits. Make all calibration and adjustments required to assure proper operation.

5. Check compatibility with data handling system for proper recording of receiver outputs, which will include video output as a function of antenna pointing angle, scan limits, and laboratory position with time of measurement.

6. Validate operational procedures and techniques by performing a dummy run across the test area in accordance with the predetermined operational test procedure. This may include detecting, acquiring, and locking onto a ground-based transponder located within the test area.

7. If the receiver is tunable to several frequencies, repeat the electromagnetic compatibility test with the receiver operating at each of the selected frequencies.

JUSTIFICATION

Same as Task No. 700

TASK PARAMETERS

NO. 1723 TITLE Install Sferics Receiver

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 18

PREDECESSOR TASK NO. 673, 201, 202

SUCCESSOR TASK NO. AND INITIAL LAG TIME 723, 0

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 520 LB SHIPPING VOLUME 20 FT^3

EQUIPMENT REQUIRED

ID	NAME
22	Directional Sferics Receiver
-	Large Antenna
-	Installation Kit

NO. 723 TITLE System Integration--Sferics

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 9 NO. OF CYCLES 20

PREDECESSOR TASK NO. 1723

SUCCESSOR TASK NO. AND INITIAL LAG TIME 773, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	3	0

ELECTRICAL POWER 160 W 1.5 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1723)

EQUIPMENT REQUIRED

ID	NAME
10	Television System
19	Camera
22	Directional Sferics Receiver

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This Section Contains
Task Numbers 753 through 773

TASK NO. 753 TITLE Design Evaluation and Approval Tests--Dual-Channel Visible Radiometer

LEVEL Design Evaluation and Approval Test

CANDIDATE INSTRUMENT Dual-Channel Visible Radiometer

DESCRIPTION

Both channels of the dual-channel visible radiometer are tuned approximately to the molecular oxygen absorption band centered at 0.762 μ. One channel is centered on the absorption band, and the other channel is at a slightly shorter wavelength that is a a transparent window. The ratio between the outputs of these two windows is used to establish cloud height, since this ratio is a measure of the amount of 0.762-μ energy reflected by a cloud after being attenuated by a column of oxygen. Higher altitude clouds reflect a larger amount of sunlight since there is a smaller optical path of oxygen through which sunlight must pass.

The general test method will be to point the radiometer straight down at zero degrees nadir angle and make a series of simultaneous measurements using both radiometer channels as the laboratory passes over a test area. This will give a single line of data points. It would be desirable to have several lines of data points both to the left and to the right of the ground track of the vehicle. The radiometer, therefore, should be scanned at right angles to the laboratory orbit path to provide these additional data points. Since the path length increases at viewing angles other than straight down, and the phenomena being monitored is a function of path length, suitable data correction factors will be required. Corrections will also be required for the zenith angle of the sun and zenith angle of the laboratory relative to the cloud which is being measured.

A unique calibration method may be used by observing a balloon with a surface consisting of a mosaic of small plastic corner reflectors. As the laboratory orbits between the balloon and the sun anywhere within an approximate 10^{o} reflection angle from the balloon, the effect of the double slant path for all values of two equal zenith angles can be determined. From these data, it should be possible to extract correction values for unequal zenith angles. By knowing the laboratory orbital path, it should be relatively easy to launch small balloons at the correct time to be observed by the scanning radiometer as it passes over the test area.

Necessary equipment will include a calibrated light source module, instrument mounting kit, and a precision aligning kit.

JUSTIFICATION

This task relates to a dual-channel visible radiometer used to measure height of cloud tops and is required to evaluate the ability of the instrument/laboratory system to make satisfactory measurements. System performance will be matched against design requirements. Satisfactory completion of these tests will constitute design approval and formal acceptance of the instrument for subsequent prototype operational use.

TASK PARAMETERS

NO. 753 TITLE Design Evaluation and Approval Tests-- Dual-Channel Visible Radiometer

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 6 NO. OF CYCLES 20

PREDECESSOR TASK NO. 703

SUCCESSOR TASK NO. AND INITIAL LAG TIME 80901, 0 hr; 82401, 0 hr; 83501, 0 hr; 83801, 0 hr; 84401, 0 hr.

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 100 W 2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
21	Dual-Channel Visible Radiometer
10	Television System
19	IR Camera

TASK NO. 754 TITLE Design Evaluation and Approval Test--Infrared Spectrometer

LEVEL Design Evaluation and Approval Test

DESCRIPTION

This task is necessary to evaluate the ability of the complete instrument/laboratory system to make measurements which satisfactorily compare with design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument for subsequent prototype operational use.

An IR spectrometer is to be tested for accuracy in pointing, calibration, spectrum resolution, and the time required for completing scan path.

The purpose of the test will be to determine total IR energy received from a particular pointing location over a band of frequencies.

The test procedure involves mounting the radiometer externally to the laboratory and checking against a calibrated light source module. Test data will be obtained by aligning and pointing at a single point on Earth during a scan period. Several points, in sequence, are to be selected with various scan periods to determine optimum scan times for various levels of thermal radiation. Recording of test data and pointing maneuvers will be controlled inside the laboratory.

The equipment required will include an instrument mounting kit and an optical alignment and adjustment kit.

JUSTIFICATION

This task relates to an IR spectrometer which is used to measure thermal radiation. The purpose of this instrument is to determine the total IR energy received from a particular pointing direction over a band of IR frequencies. In effect, this instrument scans a very narrow bandpass filter across the band of frequencies covered by the instrument. The total energy is determined by integrating all energy received during the time of one scan cycle. One purpose of the task is to determine which combination of spectrum resolution and scanning time are required to give the most meaningful resolution of thermal data. If the scanning time is of appreciable length, it may be necessary to synchronize the gimballed mount of the instrument in such a way that it will continue to point toward one spot on Earth during an instrument scan cycle. After collecting data from one point, the mount will then aim the instrument forward on the flight path and again observe a single point during another scan cycle. This operation will then be repeated a number of times to acquire a number of data points along the orbital path.

This task should be repeated under several operating conditions. There will be a series of tests with various scanning times, a series of tests with the mount moving in such a way that only a single point is observed during the scanning time, and a series of tests with the mount not moving. This latter test may indicate the value of synchronizing the gimbal rate to keep the instrument pointed at a single target area. It is possible that the total thermal radiation does not vary rapidly enough to make this refinement necessary. Tests should be made using lenses with wider fields of view. This would increase the energy received by the instrument and allow a corresponding decrease in the scanning time required.

After analyzing the results from a series of tests involving the variable parameters indicated, the best combination can be selected to determine the final operational instrument.

TASK PARAMETERS

NO. 754 TITLE Design Evaluation and Approval Test--Infrared Spectrometer

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 30

PREDECESSOR TASK NO. 704

SUCCESSOR TASK NO. AND INITIAL LAG TIME 817, 0 hr; 840, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 100 W 1.0 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
–	Infrared Spectrometer
10	Television System
19	Infrared Camera

TASK NO. 758 TITLE Design Evaluation and Approval Tests -- Wide-Band Visible Radiometer

LEVEL Design Evaluation and Approval Test

DESCRIPTION

A wide-band visible radiometer is to be tested for functional operation, sensitivity, and angle of view.

The test will be conducted externally to the laboratory by a single member of the crew. He will mount and align the radiometer on suitable gimballed receptacles and then present a wide-band visible light source test module which will checkout angular resolution and sensitivity. After checkout calibrations, the instrument will be directed toward Earth to obtain albedo test data. All data is to be recorded internally to the laboratory.

Auxiliary equipment will include an instrument mounting and aligning kit and a wide-band visible radiation test module.

JUSTIFICATION

A wide-band visible radiometer is to be tested for functional operation, sensitivity (to confirm design specifications under space environment), and to calibrate the viewing angle with field of view.

These tasks will be required to evaluate the ability of the complete instrument/laboratory system to make satisfactory measurements. System performance will be compared to design requirements. Satisfactory completion of these tasks will constitute design approval and a formal acceptance of the instrument for subsequent prototype operational use.

TASK PARAMETERS

NO: 758 TITLE Design Evaluation and Approval Tests--Wide-Band Visible Radiometer

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 700

SUCCESSOR TASK NO. AND INITIAL LAG TIME 818, 0 hr; 841, 0 hr; 843, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 100 W 0.5 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
21	Visible Radiometer
10	Television System
19	Infrared Camera

TASK NO. 760 TITLE Design Evaluation and Approval Tests--Visible Polarimeter

LEVEL Design Evaluation and Approval Test

DESCRIPTION

1. Install, checkout, and align polarimeter.

2. While over a clouded area, point polarimeter at a cloudtop known to contain ice crystals. Set instrument gimbal system to track the cloudtop. The cloud should be located well forward of the laboratory position. Make polarization measurements at periodic intervals of the same cloud as the laboratory passes over. Continue measurement until the cloud is at a reasonable angle rearward.

3. Record at least the following data at specified intervals:

   A. Degree of polarization.

   B. Polarization angle.

   C. Gimbal angle readings at each measurement.

   D. MORL orbital location and attitude.

   E. Time.

   F. Local sun elevation angle.

   G. Television frame or photograph of area containing the cloudtop at several viewing positions.

4. To make the data most meaningful, items 2 and 3 should be performed at the time other instruments are being used to measure temperature of cloudtops and height of cloudtops. This requires correlation of the instrument's output with data obtained by dual-channel television system for height of cloudtops and with the narrow-band IR radiometer for obtaining cloudtop temperature. An alternative instrument for determination of height of cloudtops could be the dual-channel visible radiometer.

5. Repeat items 2, 3, and 4 above for several cloudtops which appear to have a different concentration of ice crystals including one or two clouds having no ice crystals. A similar series of tests should be made using different lenses having different fields of view on the polarimeter.

6. Reduce test results to determine the best combinations of field of view, angle of view, and sun elevation angle for making polarization measurements on an operational basis.

JUSTIFICATION

This task is necessary to evaluate the performance of the complete instrument/laboratory system in making measurements. The system performance will be compared to design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument for subsequent prototype operational use.

This instrument is used to measure the amount of polarized light reflected from a cloudtop. The degree of polarization is an indication of the relative amounts of water vapor and ice crystals in the cloud. The greater the amount of crystals, the greater the polarization effect. The degree of polarization which can be measured is dependent upon the viewing direction of the instrument and also upon the sun angle. Therefore, as the instrument is turned and pointed to different cloudtops within its field of view, these angles must also be measured accurately. For the data obtained to be meaningful, it must also be correlated with the temperature data, the height of the cloudtops, and a picture taken either by the high resolution television system or a suitable camera over the same test area. This instrument may require manual operation, since it may be a human decision as to which cloudtops are of interest. The operator must then point the instrumentation in that direction. Since the polarization measurement is not instantaneous (rather, it requires a period of time), the gimbal system should keep the instrument pointed directly at the cloud. Because of the high orbital velocity of the laboratory, this tracking function probably should be automatic once the instrument has been aimed at the desired initial direction. Polarization measurements should be made with several lenses having different fields of view since the accuracy with which the polarization angle can be measured may depend upon the magnification of the area of interest.

TASK PARAMETERS

NO. 760 TITLE Design Evaluation--Visible Polarimeter

INTERRUPTIBLE Yes DURATION (HR) 0.75 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 710

SUCCESSOR TASK NO. AND INITIAL LAG TIME 836, 0 hr; 846, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.75	0

ELECTRICAL POWER 100 W 0.75 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
23	Visible Polarimeter
10	Television System
19	Infrared Camera

TASK NO. 761 TITLE Design Evaluation and Approval Tests--Ultraviolet Spectrometer

LEVEL Design Evaluation and Approval Test

DESCRIPTION

The test involves a UV spectrometer to measure ozone absorption at several points in the UV spectrum.

The purpose of the test is to determine sensitivity, pointing accuracy, angular resolution, spectral resolution, and functional operation under space environment.

A single crew member will mount the instrument externally to the laboratory on suitable gimballed sites. He will check the instrument with the aid of a UV-radiation test module. Test data will be obtained by observing distant targets during daylight illumination. All data will be automatically recorded internally to the laboratory where scanning rates will be analyzed.

Auxiliary equipment will include an instrument mounting kit, an instrument aligning kit, and a calibrated UV test module.

JUSTIFICATION

This task is necessary to evaluate the ability of the complete instrument/laboratory system to make measurements which satisfactorily compare with design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument for subsequent prototype operational use.

The task relates to a UV spectrometer which is used to measure ozone.

This instrument makes measurement of ultraviolet energy at several points within the UV spectrum which are sensitive to ozone absorption. The measurements on all channels are made simultaneously. The amount and distribution of ozone is indicated by the relative magnitudes of energy in each of the channels. Since the field of view with this instrument is on the order of 100 mi sq, pointing accuracy and angular resolution are not required to a high degree of precision. The UV spectrometer may be designed to use a scanning action across the ozone frequency band rather than use several individual detectors at specific points in the band. If the scanning time can be rapid enough, the readings could be considered simultaneous. In this case, the calibration and sensitivity determination of a single detector would be required rather than requiring the relative calibration of several detectors. The evaluation of this instrument can be made during any part of the daylight orbit over areas of known ozone content and is not limited to operation in a twilight area, as was required of the dual-channel UV radiometer which was also considered for measuring ozone.

TASK PARAMETERS

NO. 761 TITLE Design Evaluation--Ultraviolet Spectrometer

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 711

SUCCESSOR TASK NO. AND INITIAL LAG TIME 80502, 0 hr; 84202, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 100 W 1 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
20	Ultraviolet Spectrometer

TASK NO. 763 TITLE Design Evaluation and Approval Tests--Dual Star Tracker

LEVEL Design Evaluation and Approval Test

DESCRIPTION

A dual star tracker is to be tested for its accuracy in tracking stars in a selected range of magnitudes.

The instrument will be mounted externally to the laboratory by a single crew member and calibrated with a simulated star pattern module. The trackers will automatically be directed to pairs of stars by activating a computer program. Periodic confirmation of angular data will require visual checks by the crew.

The auxiliary equipment will include an instrument mounting and aligning kit, a star pattern simulation module, and a sighting and angular measuring telescope for determining star magnitudes and angular separation.

JUSTIFICATION

This task will be required to evaluate the ability of the complete instrument/laboratory system to make satisfactory measurements. System performance will be matched against design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument for subsequent prototype operational use.

This task relates to a dual star tracker used to measure atmospheric temperature and atmospheric pressure.

The dual star tracker acquires and locks onto two preselected stars. The angle between them is measured. During a particular sector of the orbit, the Earth's atmosphere and the Earth enter the field of view and obscure one of the stars. As the atmosphere is interposed between the telescope and one of the stars, light will be refracted through the atmosphere and an apparent change in angle between the two stars will be observed. The magnitude and rate of change of this angle can be interpreted in terms of atmospheric temperature and atmospheric pressure through proper data reduction. This operation is repeated for many pairs of stars at selected points on the orbit. Each of the tracking telescopes should be aimed at stars of different magnitude to determine the sensitivity of the tracking mechanism and its ability to accurately track stars within the range of magnitudes selected for the operational instrument. The pointing accuracy of the telescope toward any particular star can be determined by comparing the pointing angles with data previously computed for these particular stars from a given orbital position.

TASK PARAMETERS

NO. 763 TITLE Design Evaluation--Dual Star Tracking

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 30

PREDECESSOR TASK NO. 713

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0

ELECTRICAL POWER 100 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Dual Star Tracker

TASK NO. 766 TITLE Design Evaluation and Approval Tests of Infrared Interferometer and Multi-Slit/Multi-Detector Grating Infrared Spectrometer

LEVEL Design Evaluation and Approval Test

DESCRIPTION

This task will evaluate the two-candidate instruments. One instrument will be chosen for prototype operational use.

The multi-slit/multi-detector grating IR spectrometer is an existing instrument which could be adapted for orbital measurements. The IR interferometer, if and when developed, would be a more compact and therefore a more desirable instrument. It is expected that one of these instruments will be used to make simultaneous measurements of IR energy at several points in the spectrum. This will include an atmospheric window-reference channel and one or more channels in the water-vapor absorption band.

Measurements are to be made when passing over an area for which approximate meteorological data already exists. As the laboratory passes over the test area, all IR measurements are to be correlated with the laboratory position at the time of taking the measurements. It will also be necessary to correlate with the local sun elevation angle. The instrument should be scanned to the left and right of the laboratory ground track so that humidity data will be obtained over a ground area rather than a single line of points directly beneath the vehicle.

Measurements at angles other than straight down will measure a longer path of water vapor. The effect of these angles on the accuracy of the data should be determined by comparison with data obtained by looking straight down. System sensitivity should be determined by noting the minimum change in atmospheric humidity that makes a measurable difference in the output of the radiometer channels.

Time required for evaluating this instrument will be determined mainly by the number of passes over the test area necessary to obtain data that is meaningful and that can be correlated. Taking of data may be restricted to passes when the local sun elevation angle is within acceptable limits. Cloud-cover pictures of the test area should be made during each test to indicate viewing-angle conditions over the test area, and may be an invaluable aid to the interpretation of the data.

This test is necessary because it will be a new and novel application of a desirable instrument.

A crew member will mount the instrument external to the laboratory and present a calibrated IR-source test module for checkout procedures. Test data will be obtained by pointing the instrument at remote targets as the laboratory passes over certain specific areas. Control of the instrument and data recording will be directed automatically from inside the laboratory.

Auxiliary equipment will include an instrument mounting and alignment kit, and a calibrating IR-source module.

JUSTIFICATION

This task relates to the use of either an IR interferometer or a multi-slit/multi-detector grating IR spectrometer for the purpose of measuring atmospheric humidity and atmospheric temperature.

This task will be required to evaluate the competitive instruments and determine their ability to make satisfactory measurements. Each system's performance will be matched against design requirements. At the completion of the tests, the most satisfactory instrument will be accepted for use in subsequent prototype operations.

TASK PARAMETERS

NO. 766 TITLE Design Evaluation of Infrared Interferometer

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 30

PREDECESSOR TASK NO. 716

SUCCESSOR TASK NO. AND INITIAL LAG TIME 80105, 0 hr; 81005, 0 hr; 81205, 0 hr; 82105, 0 hr; 82505, 0 hr; 83005, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 100 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
15	Infrared Interferometer
10	Television System
19	Infrared Camera

TASK NO. 768 TITLE Design Evaluation and Approval Tests -- High-Resolution Television System

LEVEL Design Evaluation and Approval Test

DESCRIPTION

A high resolution television system will be tested to determine its ability to resolve details of ground and cloud patterns.

The task requires confirmation of pointing accuracy, angular resolution, sensitivity, and functional operations.

The test will be conducted inside the laboratory by a single crew member.

The test procedure will include presenting a test pattern target under various light intensities to ensure proper functioning. Pointing movements will also be checked at this time using a different location on the test pattern. Directing the television camera at known targets on the ground will provide a means of confirming scale factors and angular resolution through the atmosphere and thus provide an evaluation of the zoom-lens capability. The zoom lens is to be set at various focal lengths for each remote target in order to provide an evaluation curve. Instrument activity and data recording is done inside the laboratory.

The equipment necessary to conduct the test will include an instrument assembly kit and an instrument mounting and alignment kit. A television test-pattern module will also be required.

JUSTIFICATION

This task will be required in order to evaluate the ability of the complete instrument and laboratory system to take measurements which satisfactorily compare with design requirements. Satisfactory completion of these test will constitute design approval and a formal acceptance of the instrument system for subsequent prototype operational use.

This task relates to the use of a high resolution television system in obtaining cloud types and patterns. The main task in evaluating this instrument will be to determine its ability to resolve detail of ground areas and cloud types and patterns. This instrument is also considered for use as a general observational system of both atmospheric and terrestrial targets. It is planned to superimpose distinctive markers on the television observation screen which will indicate the pointing direction of the various gimballed instruments. Distinctive markers can also be displayed to indicate the areas being scanned or the scan limits.

GENERAL COMMENTS

The use of television systems in orbital vehicles has already been validated on Tiros and Nimbus vehicles. However, in the case of MORL, the system will be more flexible as to pointing direction because of the use of a gimballed mount and will have higher resolution by using a zoom lens with a possible increased number of lines to the picture. Ground features should be observed over test areas having known characteristics. The ability to resolve terrain features or specific target areas should be evaluated over the range of operation of the zoom-lens system. The ability to use the television picture and markers for aligning gimballed instruments to various pointing directions within the television field should be evaluated. Assuming that some type of storage tube device may be employed for holding particular television frames for evaluation and subsequent readout by a slow scanned system for subsequent picture transmission to the ground. Evaluation tests on this part of the system will also be required.

TASK PARAMETERS

NO. 768 TITLE Design Evaluation of the Television System

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 30

PREDECESSOR TASK NO. 718

SUCCESSOR TASK NO. AND INITIAL LAG TIME 804, 0 hr; 808, 0 hr; 811, 0 hr; 820, 0 hr; 823, 0 hr; 834, 0 hr; 839, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 200 W 1 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System

TASK NO. 769 TITLE Design Evaluation and Approval Tests -- Infrared Camera

LEVEL Design Evaluation and Approval Test

DESCRIPTION

An IR camera system, capable of displaying an image of IR energy on a special film, will be tested for typical high quality camera and film specifications.

The test will generally follow a plan similar to that used in an Earth laboratory. The camera must be mounted on a gimballed site external to the laboratory. A crewman will insert a magazine containing a large quantity of IR film into the camera. This will force a simulated IR source test pattern to the camera system. Light levels, aperture stops, automatic focusing, and viewing directions will be automatically programmed in the laboratory. The exposed film will be processed and evaluated inside the laboratory. Several types of IR film will be tested. After confirming design specifications, the camera system will be directed at cloud covers, ground and other IR sources, in order to record typical patterns under certain conditions.

Equipment will include the following: an instrument mounting and aligning kit, an IR test pattern module, a special IR film processing system, and a magnifying film viewer. Also, preloaded film magazines will be counted as a servicing tool.

JUSTIFICATION

These tests will determine the ability of the combined instrument/laboratory system to make satisfactory measurements. System performance will be matched against design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument for subsequent prototype operational use.

This task evaluates an IR camera system which is used for recording cloud types and patterns.

Parameters such as pointing accuracy, distortion, coma, and other lens aberrations must be documented to enable necessary corrections in lens design. Film will be tested for resolution, sensitivity, exposure time, proper aperture settings, and processing requirements. However, film and camera tests will overlap due to their interdependency. Auxiliary filters must also be tested for optical quality.

COMMENTS

This IR camera is a camera which has a lens system that is transparent to the infrared frequencies of interest and is film sensitive to the same frequencies. Films with different response characteristics at various frequencies may be used and band pass filters may be employed to restrict the exposure to a specific narrow band of wavelengths.

TASK PARAMETERS

NO. 769 TITLE Design Evaluation Infrared Camera

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 72 NO. OF CYCLES 10

PREDECESSOR TASK NO. 719

SUCCESSOR TASK NO. AND INITIAL LAG TIME 804, 0 hr; 808, 0 hr; 811, 0 hr; 820, 0 hr; 823, 0 hr; 834, 0 hr; 839, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0

ELECTRICAL POWER 100 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	IR Camera

TASK NO. 771 TITLE Design Evaluation and Approval Tests -- Dual-Channel Television System

LEVEL Design Evaluation and Approval Test

DESCRIPTION

One crew member will be required to assemble and mount the television camera external to the laboratory. He will align and adjust the instrument before presenting a simulated test module to check the two channels. After checkout, the camera will be pointed at a target on earth that is also being monitored by another system. This will aid in determining its field of view. The successive pairs of television frames are exposed and evaluated for ratios of brightness by the automated control system internal to the laboratory. Computation of cloud heights will also be automatic. Simultaneous tests for best lens parameters and linearity of scan can be conducted on the various targets selected.

An instrument mounting and aligning kit, a simulated IR target module, and an automatic densitometer-type evaluating instrument on board the laboratory comprise the required equipment.

JUSTIFICATION

This task will evaluate the ability of the complete instrument/laboratory system to make measurements which satisfactorily compare with design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument system for subsequent prototype operational use.

The system's ability to measure cloud heights must be tested because, after exposing successive pairs of television frames to a cloud pattern, comparisons must be made to determine the ratio of brightness of the two frames. One frame denotes the absorption through the molecular-oxygen absorption band, and the other frame is a reference derived from a nearby band.

COMMENTS

The dual-channel television system uses either a Vidicon or an image Orthicon-type camera tube that is sensitive to frequencies in the molecular oxygen band centered at 0.762 μ. The Vidicon alternately views a moderate field of cloud scenery through two similar filters. One narrow bandpass filter is centered in the molecular-oxygen absorption band. The other filter is centered in a window or reference wavelength nearby. The ratio of brightness of individual points on two successive television frames is measured and provides a measure of the 0.762 μ energy absorption by the oxygen in the atmosphere above that cloud location. This measurement can be related to the height of the cloud top at that point.

This task will expose successive pairs of television frames while passing over a cloud covered area. Pointing accuracy may be determined by comparing the center of the field of view of this instrument with the center of the field of view of other cameras, television systems, or telescopic systems that are pointed in the same direction toward a known ground target. This can be related to the time of measurement and position of the laboratory. The scan linearity of the television system is very important to the successful reduction of data from two consecutive frames because the brightness measurement is made at an identical position within each frame. The frame rate is also important to ensure that successive frames are taken of the same clouded area with an insignificant amount of movement between frames. Pairs of television frames should be obtained using lenses of different magnification to determine the proper combination of frame rate, lens, and scan linearity required to permit a meaningful reduction of the data. The height profile accuracy can only be determined by comparing the results from this test with the results from some other measurement of height of cloud tops by another instrumentation system. If the frame rate is high, the repeatability of the measurement can be determined by comparing several successive pairs of frames taken over the same area. However, the evaluation of the instrumentation method requires taking only a few pairs of frames over several different types of cloud pattern and with known variations in frame rate, magnification, and exposure time. A large field of view compacts a great deal of data into one pair of frames and, therefore, can make it difficult to resolve this amount of data. It also increases the severity of the scan linearity requirements. Conversely, a narrow field of view relaxes the linearity requirement to some extent but may increase the frame rate to avoid unacceptable motion between frames. After the analysis of many pairs of frames under different meteorological conditions has been made, the optimum combination of parameters for use in the operational instrument can be established.

Because of the high sensitivity of photoelectric detectors, such as the image Orthicon or Vidicon, it may be possible to use this instrumentation method under full moonlight conditions. Some degradation in resolution and accuracy will occur for moon phases of 90° before and after full moon and at lunar zenith angles less than 30°. Therefore, this task should be performed, not only during daylight hours, but also under selected moonlight conditions.

TASK PARAMETERS

NO. 771 TITLE Design Evaluation -- Dual-Channel Television

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 721

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 200 W 1 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Dual-Channel Television System

TASK NO. 773 TITLE Design Evaluation and Approval Tests--Directional Sferics Receiver

LEVEL Design Evaluation and Approval Test

DESCRIPTION

All test runs must be collated with laboratory position data. Visual observations of the meteorological conditions within the antenna's field of view must be also recorded for collation. Camera (visible and/or infrared) and television systems will be used.

One crew member will be required to assemble and mount the receiver inside the laboratory. (It is assumed that the large antenna, if used, has previously been assembled as a part of Task No. 723.) He will align and adjust the instrument before presenting test signals. After checkout, the antenna will be pointed at targets on earth that are also being monitored by visual systems. Sferic stroke count will be automatically tabulated for presentation on videotape or photographs showing the receiver antenna's total coverage (half-power boundaries should be shown), also longitude and latitude data.

In addition to the sferics receiver, an instrument mounting and aligning kit, a signal generator, an operator/observer's voice tape recorder, and a television system will be included.

JUSTIFICATION

This task will evaluate the ability of the complete instrument/laboratory system to make satisfactory measurements. System performance will be compared with design requirements. Satisfactory completion of these tests will constitute design approval and a formal acceptance of the instrument for prototype operational use.

These tasks are performed on a directional sferics receiver which is used to count, measure the strength of, and locate atmospheric electrical discharges. Atmospherics indicate areas of strong vertical motion related to violent storm development.

A directional sferics receiver is a broadband receiver of high-frequency rf emissions from lightning strokes. Signal location is determined either by narrow-beam antenna (at 100-500 mc/sec, antenna diameters on the order of hundreds of feet are required for 3° beams), or by radar or optical observations of lightning strokes and collating these data with the rf signals.

The ability of the directional sferics receiver system to detect, locate, and measure lightning strokes will be evaluated by these tests. Pointing accuracy, angular resolution, sensitivity, and functional operation will be evaluated.

TASK PARAMETERS

NO. 773 TITLE Design Evaluation, Sferics

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 723

SUCCESSOR TASK NO. AND INITIAL LAG TIME 847, 720 hr; 848, 720 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 160 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
22	Directional Sferics Receiver
10	Television System
19	IR Camera

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This Section Contains

Task Numbers 801-1 through 848

TASK NO. 80101 (801-1) TITLE Ground-Surface Temperature Determination for Planetary Scale Circulation

LEVEL Measurements

DESCRIPTION

This task description applies to a microwave radiometer used to determine the Earth's ground surface temperature.

1. Preparation for observation.

   A. Select proper components for experiment, such as power supply, antenna, etc.

   B. Visually inspect instrument for defects.

   C. Mount instrument. This may require an astronaut mounting the instrument inside or outside the spacecraft.

   D. Connect all electronics.

   E. Turn on electrical power to warm-up electronics.

   F. Prepare recorders for measurements, such as installing new tapes, check operation of recording equipment, etc.

   G. Perform instrument calibration.

   H. Perform calibration of subcomponents periodically, such as checking or recalibrating detectors characteristics, etc.

   I. Perform preventative maintenance.

   J. Repair instruments.

2. Perform observations. In addition to performing the standard observation, the meteorologist/astronaut should record his comments of unusual events on tape. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This could be done with a registration counter.

   B. Some of the related parameters are as follows:

      (1) Orbit number.

      (2) Orbit coordinates.

      (3) Orbit altitude.

      (4) Date and time of day.

(5) Nadir angle of observation.

(6) Azimuth angle of observation.

(7) Sun elevation.

(8) Instrument identification.

(9) Channel identification (microwave wavelength).

(10) Television picture with geographic grid.

(11) Geographic location at which instrument is pointing.

(12) Registration counter number.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration to ensure against changes of equipment performance, such as sensor sensitivity changes caused by temperature effects, etc.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.

   B. Check and adjust frequency regulator as applicable.

   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observation. This may involve making simultaneous observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

JUSTIFICATION

Ground surface temperature is a parameter of interest to the meteorological phenomena of planetary scale circulations.

Technique

The microwave radiation emitted by the ground surface is of thermal origin. In this region of the spectrum, Rayleigh Jean's approximation to the Planck's radiation law is applicable. Therefore the measured radiation is proportional to the first power of the ground surface temperature. In the microwave region, the atmospheric scattering effects due to aerosols and cloud hydrometers are small (the wavelength of the microwave radiation is very large compared to the size of the aerosol particles and cloud hydrometers); therefore, the measured microwave radiation in an atmospheric window such as 1.9, 2.07, or 3.15 cm represents the ground surface temperature.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D) Polar Orbit

Acceptable (A) High-Latitude Orbit

Accuracy

D: $1^{\circ}C$

A: $2^{\circ}C$

Horizontal Resolution

D: $(150\ \text{mi})^2$

A: $(300\ \text{mi})^2$

Vertical Resolution

D: N/A

A: N/A

Dynamic Range of Value

TBD

TASK PARAMETERS

NO. 80101 TITLE Measurement--Earth Surface Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85101, 0 hr; 85102, 0 hr; 85103, 0 hr; 85104, 0 hr; 85105, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 80105 (801-5) TITLE Measurements of Atmospheric Temperature Profile for Planetary Scale Circulation

LEVEL Measurements

DESCRIPTION

This task description applies to the IR interferometer or a multi-slit and multidetector IR grating spectrometer.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows, power supply, etc.

   B. Check and clean optics as needed.

   C. Visually inspect instrument for defects.

   D. Mount instrument. This may require an astronaut mounting the instrument inside or outside the spacecraft.

   E. Connect all electronics.

   F. Turn on electrical power to warm up electronics.

   G. Prepare recorders for measurements, for example, install new tapes, check operation of recording equipment, etc.

   H. Perform instrument calibration.

   I. Perform calibration of subcomponents periodically, that is, check or recalibrate optical filter characteristics, detector characteristics, etc.

   J. Perform preventative maintenance on instruments.

   K. Repair instruments.

2. Make observations. Besides performing the standard observation, the meteorological astronaut should record onto tape his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.

   B. Some of the related parameters are the following:

(1) Orbit number.

(2) Orbit coordinates.

(3) Orbital altitude.

(4) Date and time of day.

(5) Nadir angle of observation.

(6) Azimuth angle of observation.

(7) Sun elevation.

(8) Filter identification number.

(9) Instrument identification.

(10) Television picture with geographical grid.

(11) Geographic location to which instrument is pointing.

(12) Registration counter number.

(13) Type of IR detector.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration in order to ensure against changes of equipment performance, such as changes of sensor sensitivity caused by temperature effects, etc.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.

   B. Check and adjust frequency regulator as applicable.

   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may involve simultaneously making observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 1.0°C

A: 2.0°C

Horizontal Resolution

D: $(150 \text{ mi})^2$

A: $(300 \text{ mi})^2$

Vertical Resolution

D: 500 ft

A: 2,000 ft

Dynamic Range of Value

-100°C to +40°C

JUSTIFICATION

The purpose of this task is to determine the atmospheric temperature profile and to apply this information to the meteorological phenomena of planetary scale circulations.

Technique

The outgoing infrared radiation corresponding to the center of the absorption band originates from the top of the respective gas layer. The emitted radiation from the spectral region near the atmospheric window is received from deep layers. Therefore, by measuring the outgoing infrared radiation at ten different wavelengths in the region of 15 μ absorption band of CO_2, a temperature profile can be determined. The choice of the 15 μ absorption band appears to be preferable because of uniform mixing of carbon dioxide. Accuracy of the method depends strongly on the number of wavelengths at which the measurements are obtained. However, the number of points are limited by the noise of the system. The results are expected to be useful primarily to the upper atmosphere. For lower atmosphere, the presence of aerosols, clouds, and surface ground emission are expected to introduce large errors.

REFERENCE

L. D. Kaplan. Inference of Atmospheric Structure from Remote Radiation Measurements. J. Opt. Soc. Am., No. 49, 1959.

TASK PARAMETERS

NO. 80105 TITLE Measurement--Atmospheric Temperature Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 766

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85101 through 85105, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 136 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
15	Infrared Interferometer

TASK NO. 802 TITLE Measurements of Wind Speed and Direction for Planetary Scale Circulation

LEVEL Measurement

DESCRIPTION

This task description applies to a Radar Tracking System.

1. Preparation for observation.

   A. Select proper components for experiment, antenna, power supply, etc.

   B. Visually inspect instrument for defects.

   C. Mount instrument. This may involve an astronaut mounting the instrument inside or outside the spacecraft.

   D. Connect all electronics.

   E. Turn on electrical power to warm up electronics.

   F. Prepare recorders for measurements, such as install new tapes, check operation of recording equipment, etc.

   G. Perform instrument calibration.

   H. Perform calibration of subcomponents periodically, such as check or recalibrate, etc.

   I. Preventative maintenance on instruments.

   J. Repair instruments.

2. Make observations. Besides performing the standard observation, the meteorological astronaut should record onto tape his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.

   B. Some of the related parameters are as follows:

      (1) Orbit number.

      (2) Orbit coordinates.

      (3) Orbital altitude.

(4) Date and time of day.

(5) Nadir angle of observation.

(6) Azimuth angle of observation.

(7) Sun elevation.

(8) Instrument identification.

(9) Television picture with geographical grid.

(10) Geographic location to which instrument is pointing.

(11) Registration counter number.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration in order to ensure against changes of equipment performance, such as changes of sensor sensitivity caused by temperature effects, etc.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.

   B. Check and adjust frequency regulator as applicable.

   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High-latitude orbit

Accuracy

D: 5 knots

A: 10 knots

Horizontal Resolution

D: $(150 \text{ mi})^2$

A: $(300 \text{ mi})^2$

Vertical Resolution

D: <2,000 ft

A: <5,000 ft

Dynamic Range of Value

0 to 200 knots

JUSTIFICATION

The purpose of this task is to determine the atmospheric wind speed and direction and to apply this information to the meteorological phenomena of planetary scale circulation.

Technique

The technique suggested is to track with radar a constant-level balloon during a short time interval. During the time interval, the balloon rate of drift and direction of drift are related to wind speed and direction, respectively. Another technique to locate the balloon would be to have a constant-level balloon act as a transponder to a transmission from an orbiting satellite. The measure of the time interval for the balloon to return a signal can be related to the balloon range from the satellite. The transponder technique will provide a number of range measurements to each balloon as the satellite approaches and departs from the balloon. These range measurements will uniquely define the position of the balloon with respect to the satellite. (Reference 1.)

These constant-level balloons could also be equipped to measure pressure, temperature, and relative humidity directly and to relay this information to the interrogating satellite.

REFERENCE

V.E. Lally. Satellite Satellites--A Conjecture on Future Atmospheric-Sounding System, Bull. of Am. Meteorol. Soc., Vol. 41, No. 8, August, 1960.

TASK PARAMETERS

NO. 802 TITLE Measurement--Wind

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85101 through 85105, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 1160 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
13	Radar

TASK NO. 80301 (803-1) TITLE Measurements of Vertical Profile of Atmospheric Pressure for Planetary Scale Circulations

LEVEL Measurements

DESCRIPTION

This task description applies to a light-intensity detection and ranging system consisting of Lidar or optical radar to be used to determine the vertical distribution of atmospheric pressure.

1. Preparation for observation.

   A. Select proper components for experiment, such as the filter, optical windows, power supply, etc.

   B. Check and clean optics as needed.

   C. Visually inspect instrument for defects.

   D. Mount instrument. This may involve an astronaut mounting the instrument inside and outside the spacecraft.

   E. Connect all electronics.

   F. Turn on electrical power to warm up electronics.

   G. Prepare recorders for measurements, that is, install new tapes, check operation of recording equipment, etc.

   H. Perform instrument calibration.

   I. Perform calibration of subcomponents periodically, that is, check or recalibrate optical filter characteristics, detectors characteristics, etc.

   J. Perform preventive maintenance on instruments.

   K. Repair instruments.

2. Make observations. Besides performing the standard observation, the meteorological astronaut should record onto tape his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.

B. Some of the related parameters are the following:

(1) Orbit number.

(2) Orbit coordinates.

(3) Orbital altitude.

(4) Date and time of day.

(5) Nadir angle of observation.

(6) Azimuth angle of observation.

(7) Sun elevation.

(8) Filter identification number.

(9) Instrument identification.

(10) Television picture with geographical grid.

(11) Geographic location to which instrument is pointing.

(12) Registration counter number.

4. Monitor data for quality.

A. This may require ground-base confirmation of observations at specific geographical locations and time.

B. Repeat calibration in order to ensure against changes of equipment performance, for example, changes of sensor sensitivity caused by temperature effects, etc.

5. Monitor system operation.

A. Check electrical power (voltage and current) supplied to instrument.

B. Check and adjust frequency regulator as applicable.

C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission. This will involve preparing the the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High-latitude orbit

Accuracy

D: 0.5 mb

A: 1.0 mb

Horizontal Resolution

D: $(150\ \text{mi})^2$

A: $(300\ \text{mi})^2$

Vertical Resolution

D: 500 ft

A: 2500 ft

Dynamic Range of Value

0 to 500 mbs

JUSTIFICATION

This task is required in order to determine the vertical distribution of atmospheric pressure and to apply this information to the meteorological phenomena to be monitored, that is, planetary scale circulations.

Technique

It is proposed to determine atmospheric pressure profile by the use of Lidar or optical radar. The use of Lidar techniques from a manned space laboratory has the advantage over the ground-based searchlight techniques because of low densities and lack of aerosol particles in the vicinity of source. The backscattered energy increases with the increase of atmospheric density. From a time display of the returned energy, the density distribution of atmosphere can be obtained. A pressure profile can be obtained by integration, that is, by using the hydrostatic equation. The use of different wavelengths will be helpful in penetrating the atmosphere. The density above the ozone layer can be obtained by UV radiation. By using the radiation in the visible and longer wavelengths, the density distribution of the lower layers can be determined. The suggested wavelengths are 0.2 and 0.4 for the region of above ozone layer and for lower atmosphere respectively.

The background noise caused by the night sky is not expected to cause serious difficulties. A daytime Lidar operation in wavelengths where the Fraunhofer lines are at minimum is under study. The following meteorological information can be obtained with the same technique: Height of the cloudtop (see Task No. 80901), ozone distribution, and the presence and height of aerosol layers.

REFERENCE

D. G. Van Ornum, Global Tropopause Maps by Satellites, J. Meteorol., No. 18, 1960.

TASK PARAMETERS

NO. 80301 TITLE Measurement--Atmospheric Pressure, Vertical Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85101 through 85105, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 1130 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
14	Lidar

TASK NO. 804 TITLE Measurements ofCloud Types, Patterns, and Cover for Planetary Scale Circulations

LEVEL Measurements

DESCRIPTION

This task description applies both to an IR image recording system and a television system to be used to determine the atmospheric cloud field.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows, power supply, etc.

   B. Check and clean optics as needed.

   C. Visually inspect instrument for defects.

   D. Mount instrument. This may require an astronaut mounting the instrument inside or outside the spacecraft, as required.

   E. Connect all electronics.

   F. Turn on power to warm up electronics.

   G. Prepare recorders for measurements, that is, install new tapes, check operation of recording equipment, etc.

   H. Perform instrument calibration.

   I. Perform calibration of subcomponents periodically, for example check or recalibrate optical filter characteristics, detectors characteristics, etc.

   J. Preventative maintenance on instruments.

   K. Repair instruments.

2. Make observations. Besides performing the standard observation, the meteorological astronaut should record onto tape his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.

   B. Some of the related parameters are the following:

      (1) Orbit number.

      (2) Orbit coordinates.

      (3) Orbital altitude.

(4) Date and time of day.

(5) Nadir angle of observation.

(6) Azimuth angle of observation.

(7) Sun elevation.

(8) Filter identification number.

(9) Instrument identification.

(10) Television picture with geographical grid.

(11) Geographic location to which instrument is pointing.

(12) Registration counter number.

(13) Identify IR detectors.

(14) Identify television camera lens.

(15) Film type, if applicable.

(16) IR angular sweep rate.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration in order to ensure against changes of equipment performance, such as changes of sensor sensitivity caused by temperature effect effects, etc.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.

   B. Check and adjust frequency regulator as applicable.

   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations.

   This may involve making simultaneous observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission.

   This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: None

A: None

Horizontal Resolution

Cloud Cover

D: 1 mi

A: 5 mi

Cloud Types and Patterns

D: 1 mi

A: 5 mi

Vertical Resolution

Cloud Cover

D: 1,000 ft

A: 5,000 ft

Cloud Types and Patterns

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Cloud Cover

0 to 100%

Cloud Types and Patterns

Bands of cirrus clouds

JUSTIFICATION

This task is required to determine the cloud types, patterns and cover and to apply this information to the meteorological phenomena of planetary scale circulations.

Technique

The technique intended is to analyze the television or IR pictures for cloud patterns and cloud type and to measure the extent and amount of cover.

The television system would be used to observe the cloud field on the sunlit side of the orbit, while the IR system would be used to observe the cloud field in the dark side of the orbit. To enhance cloud details, surface features, etc. on the sunlit side, a color television system may be utilized to better advantage than a black and white system.

If the image contrast and resolution of the IR and television pictures are of sufficient quality, the pictures could have a nonmeteorological application as well (for example, an iceberg survey).

TASK PARAMETERS

NO. 804 TITLE Measurement -- Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85101 through 85105, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	Infrared Radiometer
19	Camera

TASK NO. 80502 (805-2) TITLE Measurements of Atmospheric Ozone for Planetary Scale Circulations

LEVEL Measurements

DESCRIPTION

This task description applies to the ultraviolet spectrometer to be used to determine the atmospheric content and distribution of ozone.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows and power supply.

   B. Check and clean optics as needed.

   C. Visually inspect instrument for defects.

   D. Mount instrument. This may involve an astronaut mounting the instrument inside and outside the spacecraft.

   E. Connect all electronics.

   F. Turn on electrical power to warm up electronics.

   G. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.

   H. Perform instrument calibration.

   I. Perform calibration of subcomponents periodically, such as check or recalibrate optical filter characteristics and detectors characteristics.

   J. Preventative maintenance on instruments.

   K. Repair instruments.

2. Make observations. Besides performing the standard observation, the meteorological astronaut should record onto tape his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters can be properly identified with the data. This can be done with a registration counter.

   B. Some of the related parameters are as follows:

      (1) Orbit number.

      (2) Orbit coordinates.

      (3) Orbital altitude.

(4) Date and time of day.

(5) Nadir angle of observation.

(6) Asimuth angle of observation.

(7) Sun elevation.

(8) Filter identification number.

(9) Instrument identification.

(10) Television picture with geographical grid.

(11) Geographic location to which instrument is pointing.

(12) Registration counter number.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration in order to ensure that changes of equipment performance, such as sensor sensitivity changes caused by temperature effects do not occur.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.

   B. Check and adjust frequency regulator as applicable.

   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may require making simultaneous observations with other instruments, such as voice recording of special events and photographing points of interest.

7. Prepare data for transmission. This will entail preparing the tapes with data for readout at a given time. It may also require preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 5%

A: 10%

Horizontal Resolution

D: $(150\ mi)^2$

A: $(300\ mi)^2$

Vertical Resolution

D: $< 1,000$ ft

A: $< 5,000$ ft

Dynamic Range of Value

0 to 1 cm STP

(0 to 20 μg 1 kg)

JUSTIFICATION

This task is required to determine the vertical distribution and the total amount of ozone in an atmospheric column and to apply this information in the various analyses of the meteorological phenomena and planetary scale circulations.

Technique

The proposed technique is to measure backscattered ultraviolet solar radiation in the Hartley absorption band of 2, 200 to 3, 200 Å. In the center of the absorption band, the backscattered solar radiation originates from upper layers (above 40 km). The reason is that the scattered ultraviolet radiation in the lower layers is absorbed by the upper atmosphere due to strong ozone absorption present in this region of spectrum. In the wing of absorption band (about 3, 000 Å), the radiation received is from 12 km (stratosphere). Therefore, the radiation observed at different wavelengths in the Hartley absorption band corresponds to the solar backscattered ultraviolet radiation emerging from above different heights, depending on amount and distribution of ozone in the atmosphere.

The theoretical work considers scattering by a molecular atmosphere and absorption by ozone. The ultraviolet backscattered solar radiation is obtained by solving the appropriate equation of the radiative transfer. A comparison of measurements of the ultraviolet solar backscattered radiation at different wavelengths in the Hartley absorption band of ozone with theoretical computations will furnish us with the vertical distribution and the total amount of ozone present in the upper atmosphere.

The effect of aerosols and horizontal nonuniformity are not considered in this method. Also consideration must be given to the effect of tropospheric scattering which depends on the solar zenith angle and the not very well known scattering due to presence of clouds and aerosols.

REFERENCES

1. S. F. Singer and R. C. Wentworth. A Method for the Determination of the Vertical Ozone Distribution from a Satellite. J. Geophys. Res., 62, 1957.

2. S. Twomey. On the Deduction of Vertical Distribution of Ozone by Ultraviolet Spectral Measurements from a Satellite. J. Geophys. Res., 66, 1961.

3. A. Sekera and J. V. Dave. Determination of the Vertical Distribution of Ozone from the Measurements of Diffusely Reflected Ultraviolet Solar Radiation. Planetary Space Science, 5, 1961.

TASK PARAMETERS

NO. 80502 TITLE Measurement--Ozone

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 761

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85101 through 85105, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2.0	0

ELECTRICAL POWER 186 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
20	UV Spectrometer

TASK NO. 808 TITLE Measurements of Cloud Types, Patterns, and Cover for Tropical Vortices, Tropical Storms, and Hurricanes

LEVEL Measurements

DESCRIPTION

Same as for Task No. 804.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous orbit

Acceptable (A):
1. Low latitude orbit
2. High latitude orbit
3. Polar orbit

Accuracy

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: None

A: None

Horizontal Resolution

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: 0.5 mi

A: 3 mi

Vertical Resolution

Cloud Cover

D: 1,000 ft

A: 5,000 ft

Cloud Types and Patterns

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Cloud Cover

0 to 100%

Cloud Types and Patterns

Spiral bands of convective clouds

JUSTIFICATION

This task is required in order to determine the cloud types, patterns, and cover and to apply this information to the meteorological phenomena of tropical vortices, tropical storms, and hurricanes.

Technique

The technique intended is to analyze the television or infrared pictures for cloud patterns and cloud type and to measure the extent and amount of cover.

The television systems would be used to observe the cloud field on the sunlit side of the orbit, while the infrared system would be to observe the cloud field in the dark side of the orbit. To enhance cloud details and surface features on the sunlit side, a color television system may be better than a black and white system.

If the image contrast and resolution of the infrared and television pictures are of sufficient quality, then the pictures could have a nonmeteorological application as well (such as iceberg survey).

TASK PARAMETERS

NO. 808 TITLE Measurement of Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85201 through 852012, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	Infrared Radiometer
19	Camera

TASK NO. 80901 (809-1) TITLE Measurement of Cloud-Top Height for Tropical Vortices, Tropical Storms, and Hurricanes

LEVEL Measurements

DESCRIPTION

This task description applies to a dual-channel near-infrared radiometer, to be used to determine the height of cloud tops.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows and power supply.

   B. Check and clean optics as needed.

   C. Visually inspect instrument for defects.

   D. Mount the instrument inside or outside the spacecraft, as required.

   E. Connect all electronics.

   F. Turn on electrical power to warm up electronics.

   G. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.

   H. Perform instrument calibration.

   I. Perform calibration of subcomponents periodically, such as check or recalibrate optical filter characteristics and detectors characteristics.

   J. Preventative maintenance on instruments.

   K. Repair instruments.

2. Make observations. In addition to performing the standard observations, the meteorologist/astronaut should tape record his comments of unusual events. The events may be nonmeteorological

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.

   B. Some of the related parameters are as follows:

      (1) Orbit number.

      (2) Orbit coordinates.

      (3) Orbital altitude.

      (4) Date and time of day.

(5) Nadir angle of observation.

(6) Azimuth angle of observation.

(7) Sun elevation.

(8) Filter identification number.

(9) Instrument identification.

(10) Television with geographical grid.

(11) Geographic location at which instrument is pointing.

(12) Registration counter number.

(13) Infrared detector identification.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration in order to ensure against change of equipment performance, such as sensor sensitivity changes caused by temperature effects.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.

   B. Check and adjust frequency regulator as applicable.

   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events and photographing points of interest.

7. Prepare data for transmission. This will entail preparing the tapes with data for readout at a given time. It may also include preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous orbit

Acceptable (A):
1. Low latitude orbit
2. High latitude orbit
3. Polar orbit

Accuracy

D: 500 ft

A: 2,000 ft

Horizontial Resolution

D: 5 mi

A: 20 mi

Vertical Resolution

D: 500 ft

A: 2,000 ft

Dynamic Range of Values

0 to 80,000 ft MSL

Technique

The proposed technique is to determine the total amount of gas present in the atmosphere above the top of a cloud, by measuring the absorption of the radiation in the corresponding absorption band. In this method, the radiation is measured in two different wavelengths in the absorption band of the absorbing gas and in a reference window respectively. By comparing the two measured intensities, the amount of the absorbing gas above the cloud top is determined, and consequently the height of the cloud top is determined. Measurements in and outside of the 0.76 absorption band of oxygen are considered to be appropriate. The effect of different solar-zenith angles should be taken into consideration. Also corrections due to the backscattering of clouds should be checked.

JUSTIFICATION

Height of cloud tops is a parameter of interest to the meteorological phenomena of tropical vorticies, tropical storms and hurricanes.

GENERAL COMMENTS

A MORL program will give us the possibility of conducting measurements in several pairs of wavelengths such as in the outside of the 2.0 absorption band of CO_2 and 1.87 absorption band of water vapor. In addition, the comparison can be made with the determination of height of the cloud tops by the infrared measurements in the 10 to 12 atmospheric window.

REFERENCES

1. R. A. Hanel. Determination of Cloud Altitude Form A Satellite. Journal of Geophysics; Res., 66, 1961.

2. G. Yamamoto and D. Q. Wark. Discussion of the Letter by R. A. Hanel, Determination of Cloud Altitude Form A Satellite. Journal of Geophysics, Res., 66, 1961.

TASK PARAMETERS

NO. 80901 TITLE Measurement - Height of Cloud Tops

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 753

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85201, through 852012, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 81001 (810-1) TITLE Measurements of Earth's Ground-Surface Temperature for Tropical Vortices, Tropical Storms, and Hurricanes

LEVEL Measurements

DESCRIPTION

Same as for Task Number 80101

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous orbit.

Acceptable (A):
1. Low latitude orbit.
2. High latitude orbit.
3. Polar orbit.

Accuracy

D: <0.5° C

A: <1.0° C

Horizontal Resolution

D: $(1\ \text{mi})^2$

A: $(5\ \text{mi})^2$

Vertical Resolution

D: N/A

A: N/A

Dynamic Range of Value

TBD

JUSTIFICATION

The purpose of this task is to measure the ground surface temperature and to apply this information to the meteorological phenomena of tropical vortices, tropical storms and hurricanes.

Technique

The microwave radiation emitted by the ground surface is of thermal origin. In this region of spectrum the Rayleigh Jean's approximation to the Planck's radiation law is applicable. Therefore, the measured radiation is proportional to the first power of the ground surface temperature. In the microwave region, the atmospheric scattering effects due to aerosols and cloud hydrometeors are small (the wavelength of the microwave radiation is very large compared to the size of the aerosol particles and cloud hydrometeors); therefore, the measured microwave radiation in an atmospheric window such as 1.9 cm, 2.07 cm, or 3.15 cm represents the ground surface temperatures.

Simultaneous measurements in microwave and infrared radiation are useful in the study of different ground surfaces such as the ice-covered region of the Earth. A manned orbital program makes this possible.

TASK PARAMETERS

NO. 81001 TITLE Measurement — Earth Surface Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85201 through 825012, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television-System
12	Microwave Radiometer

TASK NO. 81005 (810-5) TITLE Measurements of Atmospheric Temperature Profile for Tropical Vortices, Tropical Storms, and Hurricanes

LEVEL Measurement

DESCRIPTION

Same as for Task Number 80105

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous orbit.

Acceptable (A):
1. Low latitude orbit.
2. High latitude orbit.
3. Polar orbit.

Accuracy

D: $<0.5°C$

A: $<1.0°C$

Horizontal Resolution

D: $(1 \text{ mi})^2$

A: $(5 \text{ mi})^2$

Vertical Resolution

D: 200 ft

A: 500 ft

Dynamic Range of Value

-100°C + 40°C

JUSTIFICATION

The purpose of this task is to determine the atmospheric temperature profile and to apply this information to the meteorological phenomena of tropical vortices, tropical storms and hurricanes.

Technique

The outgoing infrared radiation corresponding to the center of the absorption band originates from the top of the respective gas layer. The emitted radiation from the spectral region near the atmospheric window is received from deep layers. Therefore, by measuring the outgoing infrared radiation at ten different wavelengths in the region of 15μ absorption band of CO_2, a temperature profile can be determined. The choice of the 15μ absorption band appears to be preferable because of uniform mixing of carbon dioxide. Accuracy of the method depends strongly on the number of wavelengths at which the measurements are obtained. However, the number of points are limited by the noise of the system. The results are expected to be useful primarily to the upper atmosphere. For lower atmosphere, the presence of aerosols, clouds, and surface ground emission are expected to introduce large errors.

REFERENCE

L. D. Kaplan. Inference of Atmospheric Structure from Remote Radiation Measurements. J. Opt. Soc. Am., 49, 1959.

TASK PARAMETERS

NO. 81005 TITLE Measurement — Atmospheric Temperature Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 766

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85201 through 852012, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 136 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
15	Infrared Interferometer

TASK NO. 811 TITLE Measurements of Cloud Types, Patterns, and Cover for Extratropical Cyclones and Anticyclones

LEVEL Measurements

DESCRIPTION

Same as Task No. 804

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: None

A: None

Horizontal Resolution

Cloud Cover

D: 1 mi

A: 5 mi

Cloud Types and Patterns

D: 1 mi

A: 5 mi

Vertical Resolution

Cloud Cover

D: 1,000 ft

A: 5,000 ft

Cloud Types and Patterns

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Cloud Cover

0 to 100%

Cloud Types and Patterns

Large spirals of clouds

JUSTIFICATION

The purpose of this task is to determine the cloud types, patterns, and cover and to apply this information to the meteorological phenomena of extratropical cyclones and anticyclones.

Technique

The technique intended is to analyze the television or infrared pictures for cloud patterns and cloud type and to measure the extent and amount of cover.

The television systems would be used to observe the cloud field on the sunlit side of the orbit, while the infrared system would observe the cloud field in the dark side of the orbit. To enhance cloud details and surface features on the sunlit side, a color television system may be better than a black and white system.

If the image contrast and resolution of the infrared and television pictures are of sufficient quality, then the pictures could have a nonmeteorological application as well (such as iceberg survey).

TASK PARAMETERS

NO. 811 TITLE Measurement — Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	Infrared Radiometer
19	Camera

TASK NO. 81201 (812-1) TITLE Measurements of Earth's Ground Surface Temperature for Extratropical Cyclones and Anticyclones.

LEVEL Measurements

DESCRIPTION

Same as for Task No. 80101

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: $< 0.5^{\circ}C$

A: $< 1.0^{\circ}C$

Horizontal Resolution

D: $(10 \text{ mi})^2$

A: $(50 \text{ mi})^2$

Vertical Resolution

D: - N/A

A: - N/A

Dynamic Range of Value

TBD

JUSTIFICATION

The purpose of this task is to measure the ground surface temperature and to apply this information to the meteorological phenomena of extratropical cyclones and anticyclones.

Technique

The microwave radiation emitted by the ground surface is of thermal origin. In this region of spectrum, the Rayleigh Jean's approximation to the Planck's radiation law is applicable. Therefore, the measured radiation is proportional to the first power of the ground surface temperature. In the microwave region, the atmospheric scattering effects due to aerosols and cloud hydrometeors are small (the wavelength of the microwave radiation is very large compared to the size of the aerosol particles and cloud hydrometeors); therefore, the measured microwave radiation in an atmospheric window, such as 1.9 cm, 2.07 cm, or 3.15 cm, represents the ground surface temperatures.

Simultaneous measurements in microwave and infrared radiation are useful in the study of different ground surfaces, such as the ice-covered region of the Earth. A manned orbital research program makes this possible.

TASK PARAMETERS

NO. 81201 TITLE Measurement - Ground Surface Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 81205 (812-5) TITLE Measurements of Atmospheric Temperature Profile for Extratropical Cyclones and Anticyclones

LEVEL Measurement

DESCRIPTION

Same as Task No. 80105

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: $< 0.5°C$

A: $< 1.0°C$

Horizontal Resolution

D: $(50 \text{ mi})^2$

A: $(100 \text{ mi})^2$

Vertical Resolution

D: < 500 ft

A: $< 2,000$ ft

Dynamic Range of Value

$-100°C$ to $+40°C$

JUSTIFICATION

This task is required to determine the atmospheric temperature profile and to apply this information to the meteorological phenomena of extratropical cyclones and anticyclones.

Technique

The outgoing infrared radiation corresponding to the center of the absorption band originates from the top of the respective gas layer. The emitted radiation from the spectral region near the atmospheric window is received from deep layers. By measuring the outgoing infrared radiation at ten different wavelengths in the region of 15μ absorption band of carbon dioxide (CO_2), a temperature profile can be determined. The choice of the 15μ absorption band appears to be preferable because of uniform mixing of CO_2. Accuracy of the method depends strongly on the number of wavelengths at which the measurement are obtained; however, the number of points are limited by the noise of the system. The results are expected to be useful primarily to the upper atmosphere. For lower atmosphere, the presence of aerosols, clouds, and surface ground emission are expected to introduce large errors.

REFERENCE

L. D. Kaplan. Inference of Atmospheric Structure from Remote Radiation Measurements. J. Opt. Soc. Am., 49, 1959.

TASK PARAMETERS

NO. 81205 TITLE Measurement — Atmospheric Temperature Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 766

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 136 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
15	Infrared Interferometer

TASK NO. 81301 (813-1) TITLE Measurements of Vertical Profile of Atmospheric Pressure for Extratropical Cyclones and Anticyclones

LEVEL Measurements

DESCRIPTION

Same as Task No. 80301

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 0.5 mb

A: 1.0 mb

Horizontal Resolution

D: $(50 \text{ mi})^2$

A: $(100 \text{ mi})^2$

Vertical Resolution

D: 500 ft

A: 2,500 ft

Dynamic Range of Value

0 to 1,050 mb

JUSTIFICATION

Vertical distribution of atmospheric pressure is a parameter of interest to the meteorological phenomena of extratropical cyclones and anticyclones.

Technique

It is proposed to determine atmospheric pressure profile by the use of Lidar or optical radar. The use of Lidar techniques from a manned space laboratory has the advantage over ground-based searchlight techniques because of low densities and lack of aerosol particles in the vicinity of source. The backscattered energy increases with the increase of atmospheric density. From a time display of the returned energy, one can obtain the density distribution of atmosphere. A pressure profile can be obtained by integration, using the hydrostatic equation. The usage of different wavelengths will be useful in penetrating the atmosphere. The density above the ozone layer can be obtained by ultraviolet radiation. By using the radiation in the visible and longer wavelengths, the density distribution of the lower layers can be determined. The suggested wavelengths are 0.2 and 0.4 for the region of above ozone layer and for lower atmosphere respectively.

The background noise caused by the night sky is not expected to cause serious difficulties. A daytime Lidar operation in wavelengths, where the Fraunhofer lines are at a minimum, is under study. The following meteorological information can be obtained with the same technique: height of the cloud top (see Task No. 80901), ozone distribution, presence and height of aerosol layers.

REFERENCE

D. G. Van Ornum. Global Tropopause Maps by Satellites. J. of Meteorol, 18, 1960.

TASK PARAMETERS

NO. 81301 TITLE Measurement—Atmospheric Pressure

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 1130 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
14	Lidar

TASK NO. 81402 (814-2) TITLE Measurements of Rate and Amount of Precipitation for Extratropical Cyclones and Anticyclones

LEVEL Measurement

DESCRIPTION

This task description applies to an angular scanning microwave radiometer to be used to determine the rate and total amount of atmospheric precipitation.

1. Preparation for observation.

   A. Select proper components for experiment, such as antenna and power supply.
   B. Visually inspect instrument for defects.
   C. Mount instrument. This may involve an astronaut mounting the instrument inside or outside the spacecraft as required.
   D. Connect all electronics.
   E. Turn on electrical power to warm up electronics.
   F. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.
   G. Perform instrument calibration.
   H. Perform calibration of subcomponents periodically, such as check or recalibrate detectors characteristics.
   I. Preventitive maintenance on instruments.
   J. Repair instruments.

2. Make observations. Besides performing the standard observations, the meteorological astronaut should record his comments of unusual events onto tape. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   B. Some of the related parameters are as follows:

      (1) Orbit number.
      (2) Orbit coordinates.
      (3) Orbit altitude.
      (4) Date and time of day.
      (5) Nadir angle of observation.
      (6) Azimuth angle of observation.
      (7) Sun elevation.
      (8) Channel identification number.
      (9) Instrument identification.
      (10) Television picture with geographical grid.
      (11) Geographic location to which instrument is pointing.
      (12) Registration counter number.

4. Monitor data for quality.

   A. This may require ground base confirmation of observations at specific geographic locations and time.
   B. Repeat calibration in order to ensure against changes of equipment performance, such as sensor sensitivity changes caused by temperature effects.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observation. This may involve making simultaneous observations with other instruments, such as voice recording of special events and photographing points of interest.

7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 0.1 in./hr

A: 0.2 in./hr

Horizontal Resolution

D: $(10 \text{ mi})^2$

A: $(20 \text{ mi})^2$

Vertical Resolution

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

0 to 1 in./hr

JUSTIFICATION

This task is required to determine the rate and amount of atmospheric precipitation and to apply this information to the meteorological phenomena of extratropical cyclones and anticyclones.

Technique

Microwave radiation penetrates clouds much easier than the radiation in shorter wavelengths. At this region of spectrum, the cloud droplets scatter according to Rayleigh's theory and is easier to handle than the complicated Mie scattering theory, which holds for shorter wavelengths. However, for larger rain drops, Mie's theory, or an approximation to the Mie theory, should be considered. The ground surface emissivity of the microwave radiation is much less than unity, especially over the oceanic surfaces. Therefore, microwave radiation measurements indicate a cold ground and oceanic surfaces. Measuring passive microwave radiation over the cloudy regions will give useful information about cloud droplets and precipitating droplets, which will appear as warm regions above the cold background.

A manned orbital program will make it possible to use and compare simultaneous techniques.

REFERENCE

S.F. Singer. The Research Potential of Manned Earth Orbiting Spacecraft in the Field of Meteorology. Annual Spring Meetings, American Astronautical Society, AAS pre-printed No. 65 - 59, 1965.

TASK PARAMETERS

NO. 81402 TITLE Measurements – Precipitation

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO.	81501 (815-1)	TITLE	Measurements of Humidity Profile for Extratropical Cyclones and Anticyclones
LEVEL	Measurement		

DESCRIPTION

This task description applies to the multichannel microwave radiometer to be used to determine the amount and vertical profile of atmospheric water vapor.

1. Preparation for observation.
   - A. Select proper components for experiment, such as antenna and power supply.
   - B. Visually inspect instrument for defects.
   - C. Mount instrument. This may involve an astronaut mounting the instrument inside or outside the spacecraft.
   - D. Connect all electronics.
   - E. Turn on electrical power to warm up electronics.
   - F. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.
   - G. Perform instrument calibration.
   - H. Perform calibration of subcomponents periodically, such as check or recalibrate detectors characteristics.
   - I. Preventative maintenance on instruments.
   - J. Repair instruments.
2. Make observations. Besides performing the standard observations, the meteorological astronaut should record onto tape his comments of unusual events. The events may be nonmeteorological.
3. Record and store data and related parameters.
   - A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   - B. Some of the related parameters are as follows:
     - (1) Orbit number.
     - (2) Orbit coordinates.
     - (3) Orbital altitude.
     - (4) Date and time of day.,
     - (5) Nadir angle of observation.
     - (6) Azimuth angle of observation.
     - (7) Sun elevation.
     - (8) Channel identification number.
     - (9) Instrument identification.
     - (10) Television picture with geographical grid.
     - (11) Geographic location to which instrument is pointing.
     - (12) Registration counter number.
4. Monitor data for quality.
   - A. This may require ground-base confirmation of observations at specific geographical locations and time.

B. Repeat calibration in order to ensure against changes of equipment performance, such as sensor sensitivity changes caused by temperature effects.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events and photographing points of interest.

7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 5% RH

A: 15% RH

Horizontal Resolution

D: $(50\ \text{mi})^2$

A: $(100\ \text{mi})^2$

Vertical Resolution

D: 2,000 ft

A: 5,000 ft

Dynamic Range of Value

0% to 100%

JUSTIFICATION

The purpose of this test is to determine the amount and vertical profile of atmospheric water vapor, and to apply this information to the meteorological phenomena of extra-tropical cyclones and anticyclones.

Technique

The proposed technique is to measure the microwave radiation in the 1.35 cm water vapor absorption band. The solution of the equation of radiative transfer, when absorption and emission of radiation by atmospheric gases only are present, provide us with the radiation received by the instrument. Rayleigh-Jean's approximation to the Planck's radiation law is applied and an absorption coefficient according to Van Vleck's theory is used. The shape of the computed line profile by this theory depends strongly on the comparison of water vapor distribution and its maximum to the total amount of water vapor density distribution and the total amount of water vapor present in the atmosphere. In this technique additional parameters necessary are pressure and temperature profiles. Oxygen distribution can be obtained by the use of the same method, if the microwave radiation in the 0.5 cm absorption band of oxygen is measured. One of the many justifications of a manned orbital research program is the availability of additional needed parameters. Another advantage of such a program is that the large equipment load and power capability requirements of microwave instruments are not expected to create difficulties for a manned space laboratory.

REFERENCE

A. H. Barret and V. K. Chung. A Method for the Determination of High Altitude Water Vapor Abundance from Ground-Based Microwave Observations. J. Geophys, Res., 67, 1962.

TASK PARAMETERS

NO. 81501 TITLE Measurements – Humidity Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 816 TITLE Measurements of Wind Speed and Direction for Extratropical Cyclones and Anticyclones

LEVEL Measurement

DESCRIPTION

Same as Task No. 802

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 5 knots

A: 10 knots

Horizontal Resolution

D: $(50 \text{ mi})^2$

A: $(100 \text{ mi})^2$

Vertical Resolution

D: 2,000 ft

A: 5,000 ft

Dynamic Range of Value

0 to 200 knots

JUSTIFICATION

This task is required to determine the atmospheric wind speed and direction, and to apply this information to the meteorological phenomena of extratropical cyclones and anticyclones.

Technique

The technique suggested is to track with radar a constant-level balloon during a short time interval. During the time interval, the balloon rate of drift and direction of drift are related to wind speed and direction respectively. Another technique to locate the balloon would be to have a constant-level balloon acting as a transponder to a transmission from an orbiting satellite. The measure of the time interval for the balloon to return a signal can be related to the balloon range from the satellite. The transponder technique will provide a number of range measurements to each balloon as the satellite approaches and departs the balloon. These range measurements will uniquely define the position of the balloon with respect to the satellite. (See Reference.)

These constant-level-balloons could also be equipped to measure pressure, temperature, and relative humidity directly and relay this information to the interrogating satellite.

REFERENCE

V. E. Lally. Satellite Satellites - A Conjecture on Future Atmospheric-Sounding System. Bull. of Am. Meteorol. Soc., Vol. 41, No. 8, August, 1960.

TASK PARAMETERS

NO. 816 TITLE Measurements — Wind

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 1160 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
13	Radar

TASK NO. 817 TITLE Measurements of Thermal Radiation for Extratropical Cyclones and Anticyclones

LEVEL Measurements

DESCRIPTION

This task description applies to an infrared measuring instrument to be used to determine the Earth and atmospheric thermal radiation.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows, and power supply.
   B. Check and clean optics as needed.
   C. Visually inspect instrument for defects.
   D. Mount instrument. This may involve an astronaut mounting the instrument inside or outside the spacecraft.
   E. Connect all electronics.
   F. Turn on electrical power to warm up electronics.
   G. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.
   H. Perform instrument calibration.
   I. Perform calibration of subcomponents periodically, such as check or recalibrate optical filter and detectors characteristics.
   J. Preventative maintenance on instruments.
   K. Repair instruments.

2. Make observations. Besides performing the standard observations, the meteorological astronaut should record his comments of unusual events onto tape. The events may be nonmeteorological

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   B. Some of the related parameters are as follows:

      (1) Orbit number.
      (2) Orbit coordinates.
      (3) Orbital altitude.
      (4) Date and time of day.
      (5) Nadir angle of observation.
      (6) Azimuth angle of observation.
      (7) Sun elevation.
      (8) Filter identification number.
      (9) Instrument identification.
      (10) Television picture with geographical grid.
      (11) Geographic location to which instrument is pointing.
      (12) Registration counter number.
      (13) Type of IR detector.

4. Monitor data for quality.
   A. This may require ground-base confirmation of observations at specific geographical locations and time.
   B. Repeat calibration in order to ensure against changes of equipment performance, such as sensor sensitivity changes caused by temperature effects.
5. Monitor system operation.
   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.
6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events and photographing points of interest.
7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 0.1%

A: 1.0%

Horizontal Resolution

D: $(10\ \text{mi})^2$

A: $(50\ \text{mi})^2$

Vertical Resolution

D: 500 ft

A: 2,000 ft

Dynamic Range of Value

0 to 10 $\text{cal/cm}^2\text{/min}$. (0 to 10 ly/min.)

JUSTIFICATION

The purpose of this task is to determine the Earth and atmospheric distribution of thermal radiation which is required for the various meteorological analyses of extratropical cyclones and anticyclones.

Technique

The thermal outgoing radiation is due to blackbody emission of ground surface of the Earth or cloud tops and the effect of atmospheric gases on this radiation. This effect is in the form of absorption and emission of radiation by the atmospheric gases in the spectral region where the absorption bands are present. Another factor influencing the outgoing thermal radiation is the emissivity of ground surface, which is in the neighborhood of unity in the infrared region of spectrum, and varies according to the characteristics of the ground surface. Atmospheric aerosols also have been noticed to attenuate the outgoing infrared radiation. The thermal radiation is measured directly in a wide spectral bandwidth of 8 to 30 μ. Here we do not have to convert the measured radiation into an atmospheric parameter such as pressure or temperature. Therefore, the whole procedure is much simpler. Care must be taken in choosing the proper filters and the calibration. One of the channels of Tiros meteorological satellites has measured the thermal radiation. (References 1 and 2.)

REFERENCES

1. R. A. Hanel and W. G. Stroud. The Tiros II Radiation Experiment. NASA TND - 1152, 1961.
2. W. Viezee and P. A. Davis. Analysis and Interpretation of Daytime Radiation Data from Tiros III, Orbit A. Stanford Research Institute, AFCRL-64-34, 1964.

TASK PARAMETERS

NO. 817 TITLE Measurements — Thermal Radiation

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 754

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 290 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	Infrared Radiometer

TASK NO. 818 TITLE Measurements of Backscattered Solar Radiation for Extratropical Cyclones and Anticyclones

LEVEL Measurement

DESCRIPTION

This task description applies to wide-band visible radiometer to be used to determine the amount of solar backscattered radiation.

1. Preparation for observation.
   - A. Select proper components for experiment, such as filters, optical windows, and power supply.
   - B. Check and clean optics as needed.
   - C. Visually inspect instrument for defects.
   - D. Mount instrument. This may involve an astronaut mounting the instrument inside or outside the spacecraft, as required.
   - E. Connect all electronics.
   - F. Turn on electrical power to warm up electronics.
   - G. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.
   - H. Perform instrument calibration.
   - I. Perform calibration of sub-components periodically, such as check or recalibrate optical filter and detectors characteristics.
   - J. Preventative maintenance on instruments.
   - K. Repair instruments.
2. Make observations. Besides performing the standard observations, the meteorological astronaut should record his comments of unusual events onto tape. The events may be nonmeteorological.
3. Record and store data and related parameters.
   - A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   - B. Some of the related parameters are as follows:
     - (1) Orbit number.
     - (2) Orbit coordinates.
     - (3) Orbital altitude.
     - (4) Date and time of day.
     - (5) Nadir angle of observation.
     - (6) Azimuth angle of observation.
     - (7) Sun elevation.
     - (8) Filter identification number.
     - (9) Instrument identification.
     - (10) Television picture with geographical grid.
     - (11) Geographic location to which instrument is pointing.
     - (12) Registration counter number.

TASK NO. 818 TITLE Measurements of Backscattered Solar Radiation for Extratropical Cyclones and Anticyclones

LEVEL Measurement

DESCRIPTION

This task description applies to wide-band visible radiometer to be used to determine the amount of solar backscattered radiation.

1. Preparation for observation.
   - A. Select proper components for experiment, such as filters, optical windows, and power supply.
   - B. Check and clean optics as needed.
   - C. Visually inspect instrument for defects.
   - D. Mount instrument. This may involve an astronaut mounting the instrument inside or outside the spacecraft, as required.
   - E. Connect all electronics.
   - F. Turn on electrical power to warm up electronics.
   - G. Prepare recorders for measurements, such as install new tapes and check operation of recording equipment.
   - H. Perform instrument calibration.
   - I. Perform calibration of sub-components periodically, such as check or recalibrate optical filter and detectors characteristics.
   - J. Preventative maintenance on instruments.
   - K. Repair instruments.
2. Make observations. Besides performing the standard observations, the meteorological astronaut should record his comments of unusual events onto tape. The events may be nonmeteorological.
3. Record and store data and related parameters.
   - A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   - B. Some of the related parameters are as follows:
     - (1) Orbit number.
     - (2) Orbit coordinates.
     - (3) Orbital altitude.
     - (4) Date and time of day.
     - (5) Nadir angle of observation.
     - (6) Azimuth angle of observation.
     - (7) Sun elevation.
     - (8) Filter identification number.
     - (9) Instrument identification.
     - (10) Television picture with geographical grid.
     - (11) Geographic location to which instrument is pointing.
     - (12) Registration counter number.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.
   B. Repeat calibration in order to ensure against changes of equipment performance, such as sensor sensitivity changes caused by temperature effects.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observation. This may involve making simultaneous observations with other instruments, such as voice recording of special events and photographing points of interest.

7. Prepare data for transmission. This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar orbit

Acceptable (A): High latitude orbit

Accuracy

D: 0.1%

A: 1.0%

Horizontal Resolution

D: $(50 \text{ mi})^2$

A: $(100 \text{ mi})^2$

Vertical Resolution

D: None

A: None

Dynamic Range of Value

0 to 2 $\text{cal/cm}^2\text{/min.}$ (0 to 2 ly/min.)

JUSTIFICATION

This task is required to determine the amount of solar backscattered radiation and to apply this information in the various analyses of the meteorological phenomena of extratropical cyclones and anticyclones.

Techniques

The solar incoming radiation is scattered by the molecular atmosphere, aerosols, and clouds. The backscattered solar radiation depends on the solar zenith angle and the ground surface reflectivity. The intensity of the backscattered radiation increases with the increase of the optical thickness of the atmosphere. For small optical thickness, a singly scattered light will represent the backscattered solar radiation. For large optical thickness, the effect of higher order scatterings should be taken into consideration. The backscattered solar radiation is obtained by direct measurements in the spectral bandwidth of 0.2 to 6μ.

We do not have to convert the measured radiation into an atmospheric parameter such as pressure or temperature; therefore, the whole procedure is much simpler. Care must be taken in the calibration and in choosing the proper filters. One of the channels of Tiros meteorological satellites has measured the solar backscattered radiation (References 1 and 2).

REFERENCES

1. R. A. Hanel and W. G. Stroud. The Tiros II Radiation Experiment. NASA TND-1152, 1961.
2. W. Viezee and P. A. Davis. Analysis and Interpretation of Daytime Radiation Data From Tiros III, Orbit 4. Stanford Research Institute, AFCRL-64-34, 1964.

TASK PARAMETERS

NO. 818 TITLE Measurement – Backscattered Solar Radiation

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 758

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85301 through 85308, 0hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 190 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
21	Visible Radiometer

TASK NO. 819 TITLE Measurements of Wind Speed and Direction of Jet Streams.

LEVEL Measurements

DESCRIPTION

Same as Task No. 802

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): High latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: 5 kt

A: 10 kt

Horizontal Resolution

D: $(50\ \text{mi})^2$

A: $(100\ \text{mi})^2$

Vertical Resolution

D: <2,000 ft

A: <5,000 ft

Dynamic Range of Value

70 to 200 knots

JUSTIFICATION

The atmospheric wind speed and direction are parameters of interest to the meteorological phenomena of jet streams.

Technique

The technique suggested is to track with radar a constant-level-balloon during a short time interval. During the time interval, the balloon rate of drift and direction of drift are related to wind speed and direction respectively. Another technique to locate the balloon would be to have a constant-level-balloon acting as a transponder to a transmission form an orbiting satellite. The measure of the time interval for the balloon to return a signal can be related to the balloon range from the satellite. The transponder technique will provide a number of range measurements to each balloon as the satellite approaches and departs the balloon. These range measurements will uniquely define the position of the balloon with respect to the satellite. (See Reference)

These constant-level-balloons could also be equipped to measure pressure, temperature and relative humidity directly and relay this information to the interrogating satellite.

REFERENCE

V. E. Lally. Satellite Satellites - A Conjecture on Future Atmospheric-Sounding System. Bull. of Am. Meteorol. Soc., Vol. 41, No. 8, August, 1960

TASK PARAMETERS

NO. 819 TITLE Measurements — Wind

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85401, 0 hr; 85402, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 1,160 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
13	Radar

TASK NO. 820 TITLE Measurements of Cloud Types, Patterns, and Cover for Jet Streams

LEVEL Measurement

DESCRIPTION

Same as Task No. 804

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): High latitude orbit

Acceptable (A): Polar orbit

Accuracy

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: None

A: None

Horizontal Resolution

Cloud Cover

D: 0.1 mi

A: 0.5 mi

Cloud Types and Patterns

D: 0.1 mi

A: 0.5 mi

Vertical Resolution

Cloud Cover

D: 1,000 ft

A: 5,000 ft

Cloud Types and Patterns:

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Cloud Cover

0 to 100%

Cloud Types and Patterns

Bands of cirrus clouds

JUSTIFICATION

The purpose of this task is to determine the cloud types, patterns, and cover and to apply this information to the meteorological phenomena of jet streams.

Technique

The technique intended is to analyze the television or IR pictures for cloud patterns and cloud type and to measure the extent and amount of cover.

The television systems would be used to observe the cloud field on the sunlit side of the orbit. The infrared system would be used to observe the cloud field in the dark side of the orbit. To enhance cloud details and surface features on the sunlit side, a color television system may be better than a black and white system.

If the image contrast and resolution of the IR and television pictures are of sufficient quality, the pictures could have a nonmeteorological application as well (such as iceberg survey).

TASK PARAMETERS

NO. 820 TITLE Measurement – Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85401, 0 hr; 85402, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	Infrared Radiometer
19	Camera

TASK NO. 82105 (821-5) TITLE Measurements of Atmospheric Temperature Profile for Jet Streams

LEVEL Measurements

DESCRIPTION

Same as for Task No. 80105

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): High latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: $< 0.5°C$

A: $< 1.0°C$

Horizontal Resolution

D: $(20 \text{ mi})^2$

A: $(50 \text{ mi})^2$

Vertical Resolution

D: < 500 ft

A: $< 2,500$ ft

Dynamic Range of Value

-100°C to +40°C

JUSTIFICATION

The atmospheric temperature profile is a parameter of interest for application to the meteorological phenomena of jet streams.

Technique

The outgoing infrared radiation corresponding to the center of the absorption band originates from the top of the gas layer being studied. The emitted radiation from the spectral region near the atmospheric window is received from deep layers. Therefore, by measuring the outgoing infrared radiation at ten different wavelengths in the region of 15μ absorption band of CO_2, a temperature profile can be determined. The choice of the 15μ absorption band appears to be preferable because of uniform mixing of carbon dioxide. Accuracy of the method depends strongly on the number of wavelengths at which the measurements are obtained. However, the number of points are limited by the noise of the system. The results are expected to be useful primarily to the upper atmosphere. For lower atmosphere, the presence of aerosols, clouds, and surface ground emission are expected to introduce large errors.

REFERENCE

L. D. Kaplan. Interference of Atmospheric Structure from Remote Radiation Measurements. J. Opt. Soc. Am., 49, 1959.

TASK PARAMETERS

NO. 82105 TITLE Measurement — Atmospheric Temperature Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 766

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85401, 0 hr; 85402, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 136 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
15	Infrared Interferometer

TASK NO. 82201 (822-1) TITLE Measurements of Vertical Profile of Atmospheric Pressure for Jet Streams

LEVEL Measurement

DESCRIPTION

Same as Task No. 80301

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): High latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: 0.5 mb

A: 1.0 mb

Horizontal Resolution

D: $(20\ \text{mi})^2$

A: $(50\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: <2500 ft

Dynamic Range of Value

100 to 400 mb

JUSTIFICATION

The vertical distribution of atmospheric pressure is a parameter of interest to the meteorological phenomena of jet streams.

Technique

It is proposed to determine atmospheric-pressure profile by the use of Lidar or optical radar. The use of Lidar techniques from a manned space laboratory has the advantage over the ground-based searchlight techniques because of low densities and lack of aerosol particles in the vicinity of source. The backscattered energy increases with the increase of atmospheric density. From a time display of the returned energy, the density distribution of atmosphere can be obtained. A pressure profile can be obtained by integration, using the hydrostatic equation. The use of different wavelengths will be of assistance in penetrating the atmosphere. The density above the ozone layer can be obtained by ultraviolet radiation. By using the radiation in the visible and longer wavelengths, the density distribution of the lower layers can be determined. The suggested wavelengths are 0.2 and 0.4 for the region of above ozone layer and for lower atmosphere respectively.

The background noise caused by the night sky is not expected to cause serious difficulties. A daytime Lidar operation in wavelengths where the Fraunhofer lines are at minimum is under study. The following meteorological information can be obtained with the same technique: Height of the cloud top (see Task 80901), ozone distribution, presence and height of aerosol layers.

REFERENCE

D. G. Van Ornum. Global Tropopause Maps by Satellites. J. of Meteorology, 18, 1960.

TASK PARAMETERS

NO. 82201 TITLE Measurement — Atmospheric Pressure Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85401, 0 hr; 85402, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 1130 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
14	Lidar

TASK NO. 823 TITLE Measurements of Cloud Types, Patterns, and Cover of Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 804

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: None

A: None

Horizontal Resolution

Cloud Cover

D: 0.1 mi

A: 0.5 mi

Cloud Types and Patterns

D: 0.1 mi

A: 0.5 mi

Vertical Resolution

Cloud Cover

D: 1,000 ft

A: 5,000 ft

Cloud Types and Patterns

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Cloud Cover

0 to 100%

Cloud Types and Patterns

Bands of convective clouds; Large areas of stratified clouds.

JUSTIFICATION

The purpose of this task is to determine the cloud types, patterns and cover and to apply this information to the meteorological phenomena of fronts, easterly waves, and squall lines.

Technique

The technique intended is to analyze the television or infrared pictures for cloud patterns and cloud type and to measure the extent and amount of cover.

The television systems would be used to observe the cloud field on the sunlit side of the orbit, while the infrared system would be to observe the cloud field in the dark side of the orbit. To enhance cloud details and surface features, on the sunlit side, a color television system may be better than a black and white system. If the image contrast and resolution of the IR and television pictures are of sufficient quality, then the pictures could have a nonmeteorological application as well (such as iceberg survey).

TASK PARAMETERS

NO. 823 TITLE Measurement – Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
19	Camera

TASK NO. 82401 (824-1) TITLE Measurement of Cloud-Top Height for Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 80901

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: 500 ft

A: 2,000 ft

Horizontal Resolution

D: 10 mi

A: 25 mi

Vertical Resolution

D: 500 ft

A: 2,000 ft

Dynamic Range of Value

0 to 80,000 ft MSL

JUSTIFICATION

This task is required in order to determine the height of cloud tops and to apply this information to the meteorological phenomena of fronts, easterly waves, and squall lines.

Technique

The proposed technique is to determine the total amount of gas present in the atmosphere above the top of a cloud by measuring the absorption of the radiation in the corresponding absorption band. In this method, the radiation is measured in two different wavelengths; namely, in the absorption band of the absorbing gas and in a reference window. By comparing the two measured intensities, the amount of the absorbing gas above the cloud top is determined, and consequently the height of the cloud top is determined. Measurements in and outside of the 0.76 absorption band of oxygen are considered to be appropriate. The effect of different solar zenith angles should be taken into consideration. Also corrections due to the backscattering of clouds should be checked.

REFERENCES

1. R. A. Hanel. Determination of Cloud Altitude from a Satellite. J. Geophys., Res., 66, 1961.

2. G. Yamamoto and D. Q. Wark. Discussion of the letter by R. A. Hanel, Determination of Cloud Altitude From a Satellite. J. Geophys. Res., 66, 1961.

TASK PARAMETERS

NO. 82401 TITLE Measurement - Height of Cloud Tops

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 753

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 82501 (825-1) TITLE Ground-Surface Temperature Determination for Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 80101

MEASUREMENT PERFORMANCE SPECIFICATION

Type of Orbit

Desired (D): Synchronous orbit or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: < 0.5°C

A: < 1.0°C

Horizontal Resolution

D: $(20 \text{ mi})^2$

A: $(50 \text{ mi})^2$

Vertical Resolution

D: -

A: -

Dynamic Range of Value

TBD

JUSTIFICATION

The purpose of this task is to measure the ground surface temperature and to apply this information to the meteorological phenomena of fronts, easterly waves, and squall lines.

Technique

The microwave radiation emitted by the ground surface is of thermal origin. In this region of the spectrum Rayleigh Jean's approximation to the Planck's radiation law is applicable. Therefore the measured radiation is proportional to the first power of the ground surface temperature. In the microwave region, the atmospheric scattering effects due to aerosols and cloud hydrometers are small (the wavelength of the microwave radiation is very large compared to the size of the aerosol particles and cloud hydrometers); therefore, the measured microwave radiation in an atmospheric window such as 1.9 cm, 2.07 cm, or 3.15 cm represents the ground surface temperature.

TASK PARAMETERS

NO. 82501 TITLE Measurement - Earth Surface Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 82505 (825-5) TITLE Measurements of Atmospheric Temperature Profile for Fronts, Easterly Waves and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 80105

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: < 0.5°C

A: <1.0°C

Horizontal Resolution

D: $(20 \text{ mi})^2$

A: $(50 \text{ mi})^2$

Vertical Resolution

D: <500 ft

A: <2,500 ft

Dynamic Range of Value

-100°C to +40°C

JUSTIFICATION

This task is required to determine the atmospheric temperature profile, and to apply this information to the meteorological phenomena of fronts, easterly waves and squall lines.

Technique

The outgoing infrared radiation corresponding to the center of the absorption band originates from the top of the respective gas layer. The emitted radiation from the spectral region near the atmospheric window is received from deep layers. Therefore, by measuring the outgoing infrared radiation at ten different wavelengths in the region of 15μ absorption band of CO_2, a temperature profile can be determined. The choice of the 15μ absorption band appears to be preferable because of uniform mixing of carbon dioxide.

Accuracy of the method depends strongly on the number of wavelengths at which the measurements are obtained. However, the number of points are limited by the noise of the system. The results are expected to be useful primarily to the upper atmosphere. For lower atmosphere, the presence of aerosols, clouds, and surface ground emission are expected to introduce large errors.

REFERENCE

L.D. Kaplan. Inference of Atmospheric Structure from Remote Radiation Measurements. J. Opt. Soc. Am., 49, 1959.

TASK PARAMETERS

NO. 82505 TITLE Measurement - Atmospheric Temperature Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 766

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 136 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
15	Infrared Interferometer

TASK NO. 82601 (826-1) TITLE Measurements of Vertical Profile of Atmospheric Pressure for Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 80301

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: 0.5 mb

A: 1.0 mb

Horizontal Resolution

D: $(20\ \text{mi})^2$

A: $(50\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: $<2,500$ ft

Dynamic Range of Value

0 59 1050 mb

JUSTIFICATION

The purpose of this task is to determine the atmospheric-pressure profile and to apply this information in the various analyses of the meteorological phenomena, fronts, easterly waves, and squall lines.

Technique

It is proposed to determine atmospheric-pressure profile by the use of Lidar or optical radar. The use of Lidar techniques from a manned space laboratory has the advantage over the ground-based searchlight techniques because of low densities and lack of aerosol particles in the vicinity of the source. The backscattered energy increases with the increase of atmospheric density. From a time display of the returned energy, one can obtain the density distribution of the atmosphere. A pressure profile can be obtained by integration, using the hydrostatic equation. The usage of different wavelengths will be useful in penetrating the atmosphere. The density above the ozone layer can be obtained by ultraviolet radiation. By using the radiation in the visible and longer wavelengths, the density distribution of the lower layers can be determined. The suggested wavelengths are 0.2μ for the region of above ozone layer and 0.4μ for lower atmosphere.

The background noise caused by the night sky is not expected to cause serious difficulties. A daytime Lidar operation in wavelengths where the Fraunhofer lines are a minimum is under study. The following meteorological information can be obtained with the same technique: Height of the cloud top (see Task 80901), ozone distribution, presence and height of aerosol layers.

REFERENCE

D.G. Van Ornum. Global Tropopause Maps by Satellites. J. of Meteorology, 18, 1960.

TASK PARAMETERS

NO. 82601 TITLE Measurement - Atmospheric Pressure Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 1130 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
14	Lidar

TASK NO. 82701 (827-1) TITLE Measurements of Humidity Profile for Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task 81501

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: 5% RH

A: 15% RH

Horizontal Resolution

D: $(50\ \text{mi})^2$

A: $(100\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: < 2,500 ft

Dynamic Range of Value

0% to 100%

JUSTIFICATION

This task is required to determine the amount and vertical profile of atmospheric water vapor, and to apply this information to the meteorological phenomena of fronts, easterly waves, and squall lines.

Technique

The proposed technique is to measure the microwave radiation in the region of 1.35 cm water-vapor absorption band. The solution of the equation of radiative transfer, when absorption and emission of radiation by atmospheric gases only are present, provide us with the radiation received by the instrument. Rayleigh/Jean's approximation to the Planck's radiation law is applied, and an absorption coefficient according to Van Vleck's theory is used. The shape of the computed-line profile by this theory depends strongly on the water vapor distribution and its maximum when compared to the total amount of water vapor density distribution and the total amount of water vapor present in the atmosphere.

In this technique necessary additional parameters are pressure and temperature profiles. Oxygen distribution can be obtained by the use of the same method, if the microwave radiation in the region of 0.5 cm absorption band of oxygen is measured. One of the many justifications of a manned orbital research program is the availability of additional needed parameters. Another advantage of such a program, is that the large-equipment load and power capability requirements of microwave instruments are not expected to create difficulties for a manned space laboratory.

REFERENCE

A.H. Barret and V.K. Chung. A Method for the Determination of High Altitude Water Vapor Abundance from Ground-Based Microwave Observations. J. Geophys, Res., 67, 1962.

TASK PARAMETERS

NO. 82701 TITLE Measurement - Humidity Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 828 TITLE Measurements of Wind Speed and Direction for Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 802

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous or high latitude orbit

Acceptable (A): Polar orbit

Accuracy

D: 5 kt

A: 10 kt

Horizontal Resolution

D: $(35 \text{ mi})^2$

A: $(75 \text{ mi})^2$

Vertical Resolution

D: $< 2,000$ ft

A: $< 5,000$ ft

Dynamic Range of Value

0 to 200 kt

JUSTIFICATION

The atmospheric wind speed and direction are parameters of interest to the meteorological phenomena fronts, easterly wave, and squall lines.

Technique

The technique suggested is to track a constant-level balloon with radar during a short time interval. During the time interval, the balloon rate-of-drift and direction-of-drift are related to wind speed and direction, respectively. Another technique to locate the balloon would be to have a constant-level balloon acting as a transponder to a transmission from an orbiting satellite. The measure of the time interval for the balloon to return a signal can be related to the balloon range from the satellite. The transponder technique will provide a number of range measurements to each balloon as the satellite approaches the balloon and departs. These range measurements will uniquely define the position of the balloon with respect to the satellite. (See Reference)

These constant-level balloons could also be equipped to measure pressure, temperature, and relative humidity directly and relay this information to the interrogating satellite.

REFERENCE

V. E. Lally. Satellite Satellites - A Conjecture on Future Atmospheric-Sounding Systems. Bulletin of Am. Metero. Society, Vol. 41, No. 8, August, 1960.

TASK PARAMETERS

NO. 828 TITLE Measurements - Wind

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 1,160 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
13	Radar

TASK NO. 82902 (829-2) TITLE Measurements of Rate and Amount of Precipitation for Fronts, Easterly Waves, and Squall Lines

LEVEL Measurements

DESCRIPTION

Same as for Task No. 81402

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous Orbit

Acceptable (A):
1. Low Latitude Orbit.
2. High Latitude Orbit.
3. Polar Orbit.

Accuracy

D: 0.1 in./hr

A: 0.2 in./hr

Horizontal Resolution

D: $(10 \text{ mi})^2$

A: $(20 \text{ mi})^2$

Vertical Resolution

D: <1,000 ft

A: <5,000 ft

Dynamic Range of Value

0 to 1 in./hr

JUSTIFICATION

The purpose of this task is to determine the rate and amount of atmospheric precipitation and to apply this information to the meteorological phenomena of fronts, easterly waves, and squall lines.

TECHNIQUE

Microwave radiation penetrates clouds much easier than the radiation in shorter wavelengths. At this region of spectrum, the cloud droplets scatter according to Rayleigh's theory which is easier to handle than the complicated Mie scattering theory which holds for shorter wavelengths. However, for larger rain drops, Mie's theory, or an approximation to the Mie theory, should be considered. The ground surface emissivity of the microwave radiation is much less than unity, especially over the oceanic surfaces. Therefore, microwave radiation measurements indicate a cold ground and oceanic surfaces. By measuring passive microwave radiation over the cloudy regions, one can obtain useful information about cloud droplets and precipitating droplets, which will appear as warm regions above the cold background.

A manned orbital research program will make it possible to use and make comparison of simultaneous techniques.

REFERENCE

S. F. Singer. The Research Potential of Manned Earth Orbiting Spacecraft in the Field of Meteorology. Annual Spring Meetings, American Astro. Soc., AAS preprinted No. 65 - 59, 1965.

TASK PARAMETERS

NO. 82902 TITLE Measurements - Precipitation

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85501 through 85506, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 83001 (830-1) TITLE Ground-Surface Temperature Determination for Atmospheric Structure and Motion Fields

LEVEL Measurements

DESCRIPTION

Same as Task No. 80101 (801-1)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: $<0.5°C$

A: $<1.0°C$

Horizontal Resolution

D: $(20 \text{ mi})^2$

A: $(50 \text{ mi})^2$

Vertical Resolution

D: -

A: -

Dynamic Range of Value

TBD

JUSTIFICATION

This task will measure the ground surface temperature; this information will be applied to the meteorological phenomena of atmospheric structure and motion fields.

Technique

The microwave radiation emitted by the ground surface is of thermal origin. In this region of the spectrum, Rayleigh Jean's approximation to the Planck's radiation law is applicable. Therefore, the measured radiation is proportional to the first power of the ground surface temperature. In the microwave region, the atmospheric scattering effects due to aerosols and cloud hydrometers are small (the wavelength of the microwave radiation is very large compared to the size of the aerosol particles and cloud hydrometers); therefore, the measured microwave radiation in an atmospheric window such as 1.9, 2.07, or 3.15 cm represents the ground surface temperature.

TASK PARAMETERS

NO. 83001 TITLE Measurements – Ground-Surface Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85601 through 85608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 83005 (830-5) TITLE Measurements of Atmospheric Temperature Profile for Atmospheric Structure and Motion Fields

LEVEL Measurements

DESCRIPTION

Same as Task No. 80105 (801-5)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: $< 0.5°C$

A: $< 1.0°C$

Horizontal Resolution

D: $(20\ mi)^2$

A: $(50\ mi)^2$

Vertical Resolution

D: < 500 ft

A: < 2500 ft

Dynamic Range of Value

-100°C to +40°C

JUSTIFICATION

The atmospheric temperature profile is a parameter of interest to the meteorological phenomena of the atmospheric structure of motion fields.

Technique

The outgoing infrared radiation,which corresponds to the center of the absorption band, originates from the top of the respective gas layer. The emitted radiation from the spectral region near the atmospheric window is received from deep layers. Therefore, by measuring the outgoing infrared radiation at 10 different wavelengths in the region of 15μ absorption band of CO_2, a temperature profile can be determined. The choice of the 15μ absorption band region appears preferred because of uniform mixing of carbon dioxide. The accuracy of this method increases with the number of wavelengths at which the measurements are obtained. However, the number of points are limited by the noise of the system. The results are expected to be useful primarily to the upper atmosphere. For lower atmosphere, the presence of aerosols, clouds, and surface ground emission are expected to introduce large errors.

REFERENCE

L. D. Kaplan. Inference of Atmospheric Structure from Remote Radiation Measurements. J. Opt. Soc. Amer., 49, 1959.

TASK PARAMETERS

NO. 83005 TITLE Measurement — Atmospheric Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 766

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85601 through 85608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 136 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
15	IR Interferometer

TASK NO. 83101 (831-1) TITLE Measurements of Vertical Profile of Atmospheric Pressure for Atmospheric Structure and Motion Fields

LEVEL Measurements

DESCRIPTION

Same as Task No. 80301 (803-1)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 0.5 mb

A: 1.0 mb

Horizontal Resolution

D: $(20\ \text{mi})^2$

A: $(50\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: <2500 ft

Dynamic Range of Value

0 59 1050 mb

JUSTIFICATION

This task will determine the atmospheric pressure profile; this information will be applied in the various analyses of the meteorological phenomena, atmospheric structure, and motion fields.

Technique

It is proposed to determine the atmospheric pressure profile by the use of Lidar of Optical radar. The use of Lidar techniques from a manned space laboratory is more advantageous than the ground based searchlight techniques because of low densities and lack of aerosol particles in the vicinity of source. The backscattered energy increases with the increase of atmospheric density. From a time display of the returned energy, the density distribution of atmosphere can be obtained. A pressure profile can be obtained by integration, using the hydrostatic equation. The use of different wavelengths will assist in penetration of the atmosphere. By ultraviolet radiation, the density above the ozone layer can be obtained. By use of the radiation in the visible and longer wavelengths, the density distribution of the lower layers can be determined. The suggested wavelengths are 0.2μ for the region above ozone layer, and 0.4μ for lower atmosphere.

The background noise caused by the night sky is not expected to cause serious difficulties. A daytime Lidar operation in wavelengths where the Fraunhofer lines are at minimum is under study. The following meteorological information can be obtained with the same technique: height of the cloud top (see Task No. 80901 (809-1)), ozone distribution, presence and height of aerosol layers.

REFERENCE

D. G. Van Ornum. Global Tropopause Maps by Satellites. J. of Meteorology, 18, 1960.

TASK PARAMETERS

NO. 83101 TITLE Measurement — Atmospheric Pressure Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85601 through 85608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 1,130 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
14	Lidar

TASK NO. 83201 (832-1) TITLE Measurements of Humidity Profile for Atmospheric Structure and Motion Fields

LEVEL Measurements

DESCRIPTION

Same as Task No. 81501 (815-1)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 5% RH

A: 15% RH

Horizontal Resolution

D: $(50\ \text{mi})^2$

A: $(100\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: <2500 ft

Dynamic Range of Value

0% to 100%

JUSTIFICATION

This task is required to determine the amount and vertical profile of atmospheric water vapor and to apply this information to the meteorological phenomena of atmospheric structure and motion fields.

Technique

The proposed technique is to measure the microwave radiation in the region of 1.35 cm water-vapor absorption band. The solution of the equation of radiative transfer, when absorption and emission of radiation by atmospheric gases only are present, provide the amount of radiation received by the instrument. Rayleigh-Jean's approximation to the Planck's radiation law is applied, and an absorption coefficient according to Van Vleck's theory is used. By this theory, the shape of the computed line profile depends to a great extent on the water vapor distribution (and its maximum distribution) to the total amount of water vapor density distribution, and the total amount of water vapor present in the atmosphere. In this technique, additional pressure and temperature profiles parameters are necessary. By the use of the same method, oxygen distribution can be obtained if the microwave radiation in the region of 0.5 cm absorption band of oxygen is measured. One of the many justifications for a manned orbital research program is the availability of additional needed parameters. Another advantage is that the large equipment load and power capability requirement of microwave instruments are not expected to create difficulties for a manned space laboratory.

REFERENCE

A.H. Barret and V.K. Chung. A Method For The Determination of High Altitude Water Vapor Abundance From Ground-Based Microwave Observations. J. Geophys. Res., 67, 1962.

TASK PARAMETERS

NO. 83201 TITLE Measurement — Humidity Profile

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 256

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85601 through 85608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 210 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 833 TITLE Measurements of Wind Speed and Direction for Atmospheric Structure and Motion Fields

LEVEL Measurements

DESCRIPTION

Same as Task No. 802

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 5 kt

A: 10 kt

Horizontal Resolution

D: $(35\ \text{mi})^2$

A: $(75\ \text{mi})^2$

Vertical Resolution

D: <2,000 ft

A: <5,000 ft

Dynamic Range of Value

0 to 200 knots

JUSTIFICATION

The purpose of this task is to determine the atmospheric wind speed and direction and to apply this information to the meteorological phenomena of atmospheric structure and motion fields.

Technique

The technique suggested is to track a constant-level balloon with radar at short time intervals. During the time interval, the balloon rate of drift and direction of drift are related to wind speed and direction respectively. Another technique would be to locate the balloon with a constant-level balloon acting as a transponder to a transmission from an orbiting satellite. The time interval necessary for the balloon to return a signal can be related to the balloon range from the satellite. The transponder technique will provide a number of range measurements to each balloon as the satellite approaches the balloon and departs from the balloon. These range measurements will uniquely define the position of the balloon with respect to the satellite. (Reference 1.)

These constant-level balloons could also be equipped to directly measure pressure, temperature, and relative humidity and relay this information to the interrogating satellite.

REFERENCE

V. E. Lally. Satellite Satellites — A Conjecture on Future Atmospheric Sounding System. Bulletin of Amer. Meteor. Society, Vol. 41, No. 8, August, 1960.

TASK PARAMETERS

NO. 833 TITLE Measurements — Wind

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85601 through 85608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 1,160 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
13	Radar

TASK NO. 834 TITLE Measurements of Cloud Types, Patterns, and Cover for Thunderstorms and Tornadoes

LEVEL Measurements

DESCRIPTION

Same as Task No. 804.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous Orbit

Acceptable (A): 1. High-Latitude Orbit

2. Polar Orbit

Accuracy

Cloud Cover

D: 1%

A: 10%

Cloud Types and Patterns

D: None

A: None

Horizontal Resolution

Cloud Cover

D: 0.1 mi

A: 0.5 mi

Cloud Types and Patterns

D: 0.1 mi

A: 0.5 mi

Vertical Resolution

Cloud Cover

D: 1,000 ft

A: 5,000 ft

Cloud Types and Patterns

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Cloud Cover

0% to 100%

Cloud Types and Patterns

Large convective clouds

JUSTIFICATION

This task is required to determine the cloud types, patterns, and cover. This information will be applied to the meteorological phenomena of thunderstorms and tornadoes.

Technique

The technique will be to analyze the television or IR pictures for cloud patterns and cloud type and to measure the extent and amount of cover.

The television systems would be used to observe the cloud field on the sunlit side of the orbit, while the infrared system would observe the cloud field in the dark side of the orbit. To enhance cloud details, surface features, etc., on the sunlit side, a color television system may be superior to a black and white system.

If the image contrast and resolution of the IR and television pictures are of sufficient quality, then the pictures could have a nonmeteorological application as well (such as iceberg survey, etc.).

TASK PARAMETERS

NO. 834 TITLE Measurement – Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85701 through 85709, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
19	Camera

TASK NO. 83501 (835-1) TITLE Measurement of Cloud-Top Height for Thunderstorms and Tornadoes

LEVEL Measurements

DESCRIPTION

Same as Task No. 80901 (809-1)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Synchronous

Acceptable (A): 1. High-Latitude

2. Polar Orbit

Accuracy

D: 500 ft

A: 2,000 ft

Horizontal Resolution

D: 1 mi

A: 10 mi

Vertical Resolution

D: < 500 ft

A: <2,000 ft

Dynamic Range of Value

10,000 to 80,000 ft MSL

JUSTIFICATION

This task is required to determine the height of cloud tops and to apply this information to the meteorological phenomena of thunderstorms and tornadoes.

Technique

The proposed technique is to determine the total amount of gas present in the atmosphere above the top of a cloud by measuring the absorption of the radiation in the corresponding absorption band. In this method, the radiation is measured in two different wavelengths, namely, in the absorption band of the absorbing gas and in a reference window. By comparing the two measured intensities, the amount of the absorbing gas above the cloud top is determined; consequently, the height of the cloud top is determined. Measurements in and outside of the 0.76 absorption band of oxygen are considered appropriate. The effect of different solar zenith angles should be considered. In addition, corrections due to the backscattering of clouds should be checked.

REFERENCE

R. A. Hanel. Determination of Cloud Altitude Form A Satellite. J. Geophys. Res., 66, 1961

G. Yamamoto and D. Q. Wark. Discussion of the letter by R. A. Hanel, Determination of Cloud Altitude Form A Satellite. J. Geophys. Res., 66, 1961.

TASK PARAMETERS

NO. 83501 TITLE Measurement – Height of Cloud Tops

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 753

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85701 through 85709, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 836 TITLE Measurements of Phase of Cloud Hydrometeors for Analysis of Supercooled Clouds

LEVEL Measurements

DESCRIPTION

This task applies to the use of a polarimeter to measure the phase of cloud hydrometeors.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows, power supply, etc.
   B. Check and clean optics as needed.
   C. Visually inspect instrument for defects.
   D. Mount instrument. An astronaut will mount the instrument inside and outside the spacecraft.
   E. Connect all electronics.
   F. Turn on electrical power to warm up electronics.
   G. Prepare recorders for measurements — install new tapes, check operation of recording equipment, etc.
   H. Perform instrument calibration.
   I. Perform calibration of subcomponents periodically — check or recalibrate optical filter characteristics, detectors characteristics, etc.
   J. Preventative maintenance on instruments.
   K. Repair instruments.

2. Make observations. In addition to performing the standard observations, the meteorological astronaut should tape record his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be accomplished with a registration counter.

   B. The following are some of the related parameters.

      (1) Orbit number.
      (2) Orbit coordinates.
      (3) Orbital altitude.
      (4) Date and time of day.
      (5) Nadir angle of observation.
      (6) Azimuth angle of observation.
      (7) Sun elevation.
      (8) Filter identification number.
      (9) Instrument identification.
      (10) Television picture with geographical grid.
      (11) Geographic location to which instrument is pointing.
      (12) Registration counter number.

4. Monitor data for quality.

   A. Monitoring data for quality may require ground-base confirmation of observations at specific geographical locations and time.

   B. Repeat calibration to ensure that there are no changes of equipment performance, such as sensor sensitivity changes caused by temperature effects, etc.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission. This will involve preparing the tapes with data for read out at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut before transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 1%

A: 10%

Horizontal Resolution

D: $(1\ \text{mi})^2$

A: $(20\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: $<1,000$ ft

Dynamic Range of Value

0% to 100% Ice (Liquid)

JUSTIFICATION

This task will determine the phase of cloud hydrometeors. This information will be applied in the various analyses of the meteorological phenomena of supercooled clouds.

Technique

Intensity and polarization measurements in the visible and near-infrared region of the backscattered solar radiation from the top of a cloud will depend on the concentration and size distribution of the hydrometeors present in the cloud. The effect of solar zenith angle on the backscattered radiation measurements should be included in the technique. The water vapor absorption also has effects on the backscattered radiation measurements, although this absorption effect is not very strong in the visible and near-infrared spectrum region. The theory of such a study should include higher order scattering effects on the reflected radiation since these effects are very strong for thick clouds. In principle, the concentration and size distribution of hydrometeors can be obtained by measuring intensity and polarization of backscattered solar radiation at several wavelengths in the visible and near-infrared spectrum region. Information to the cloud-top temperature and height and cloud pictures, combined with the results of polarimetric measurements, will be useful in determining the type and the physical processes involved in a cloud.

A manned orbital research program makes it possible to obtain information simultaneously about different parameters such as temperature, intensity and polarization of backscattered solar radiation, etc., which will be useful in a meteorological phenomena study, such as in the study of clouds.

REFERENCES

D. Deirmendjian. Scattering and Polarization Properties of Polydispersed Suspensions with Partial Absorption. Rand Corporation Report No. RM-3228-PR, 1962.

E. W. Hewson. The Reflection, Absorption, and Transmission of Solar Radiation by Fog and Cloud. Quarterly Journal of Royal Meteorological Society, 69, 1943.

TASK PARAMETERS

NO. 836 TITLE Measurement — Phase of Cloud Hydrometeors

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 6

PREDECESSOR TASK NO. 760

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85801 through 85804, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 170 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
23	Visible Polarimeter

TASK NO. 837 TITLE Measurements of Cloud-Top and Ground-Surface Temperatures for Analysis of Supercooled Clouds

LEVEL Measurements

DESCRIPTION

This task applies to a narrow-band IR radiometer to be used to determine cloud-top temperature and to determine ground surface temperature.

1. Preparation for observation.

   A. Select proper components for experiment, such as filters, optical windows, power supply, etc.
   B. Check and clean optics as needed.
   C. Visually inspect instrument for defects.
   D. Mount instrument. An astronaut may be required to mount the instrument inside or outside the spacecraft.
   E. Connect all electronics.
   F. Turn on electrical power to warm up electronics.
   G. Prepare recorders for measurement — install new tapes, check operation of recording equipment, etc.
   H. Perform instrument calibration.
   I. Perform calibration of subcomponents periodically — check or recalibrate optical filter characteristics, detectors characteristics, etc.
   J. Preventative maintenance on instruments.
   K. Repair instruments.

2. Make observations. In addition to performing the standard observations, the meteorological astronaut should tape record his comments of unusual events. The events may be nonmeteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   B. Some of the related parameters are as follows:

      (1) Orbit number.
      (2) Orbit coordinates.
      (3) Orbital altitude.
      (4) Date and time of day.
      (5) Nadir angle of observation.
      (6) Azimuth angle of observation.
      (7) Sun elevation.
      (8) Filter identification number.
      (9) Instrument identification.
      (10) Television picture with geographical grid.
      (11) Geographic location to which instrument is pointing.
      (12) Registration counter number.
      (13) Type of IR detectors.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.
   B. Repeat calibration to ensure that no changes of equipment performance, such as sensor sensitivity changes were caused by temperature effects.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all related data are being recorded and properly indexed.

6. Perform special observations. This may involve making simultaneous observations with other instruments, such as voice recording of special events, photographing points of interest, etc.

7. Prepare data for transmission. This will involve preparing the tapes with data for read out at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut before transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

<u>Type of Orbit</u>

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

<u>Accuracy</u>

D: 0.5°C

A: 1.0°C

<u>Horizontal Resolution</u>

D: $(1 \text{ mi})^2$

A: $(20 \text{ mi})^2$

<u>Vertical Resolution</u>

D: <500 ft

A: $<1,000$ ft

<u>Dynamic Range of Value</u>

-100°C to +30°C

JUSTIFICATION

The purpose of this task is to determine the cloud top temperature and to apply this information to the meteorological phenomena of supercooled clouds.

Technique

The thermal outgoing radiation is due to blackbody emission of the ground surface of the earth or cloud tops. The radiation effect which results is in absorption and emission of radiation by atmospheric gases in the spectral region where the absorption bands are present. Measurements of radiation in the atmospheric window of 10-12μ corresponds to the ground surface of cloud-top emitted radiation. Therefore, by assuming blackbody radiation according to Planck's law, surface or cloud-top temperatures can be determined. However, to obtain better estimates for the surface or cloud-top temperatures, corrections which consider the influence of water vapor and ozone on the emitted radiation in the atmospheric window of 10-12μ should be made (Reference 1). The measured infrared radiation depends also on the surface emissivity which deviates from unity depending on the kind of the surface. Corrections caused by this effect should be also considered in determining surface temperatures. Determination of cloud-top temperatures and access to the temperature sounding provide an estimate to the height of cloud tops.

To eliminate the interference of water vapor and ozone on the emitted radiation, infrared measuring instruments have been developed with a detector 7 cm^{-1} wide located in the 11.1μ "window." (Reference 2) A correction due to surface emissivity will still have to be applied.

A manned orbital research program would permit several experiments to be conducted simultaneously to compare these advantages and disadvantages.

REFERENCES

1. D.Q. Wark, G. Yamamoto, and J.H. Lienesch. Methods of Estimating Infrared Flux and Surface Temperature from Meteorological Satellites. Journal of the Atmospheric Sciences, 19, 1962.

2. R.H. Hanel and D.Q. Wark. Physical Measurements from Meteorological Satellites. Astronautics and Aerospace Engineering, 3 April 1963, pp. 85 - 88.

TASK PARAMETERS

NO. 837 TITLE Measurement – Cloud Top and Ground Surface Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85801 through 85804, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer

TASK NO. 83801 (838-1) TITLE Measurement of Cloud-Top Height for Analysis of Supercooled Clouds

LEVEL Measurements

DESCRIPTION

Same as Task No. 80901 (809-1)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 500 ft

A: 4,000 ft

Horizontal Resolution

D: $(1\ \text{mi})^2$

A: $(20\ \text{mi})^2$

Vertical Resolution

D: <500 ft

A: <1,000 ft

Dynamic Range of Value

0 to 80,000 ft MSL

JUSTIFICATION

The height of cloud tops is a parameter of interest to the meteorological phenomena of supercooled clouds.

Technique

The proposed technique will determine the total amount of gas present in the atmosphere above the top of a cloud by measuring the absorption of the radiation in the corresponding absorption band. In this method, the radiation is measured in two different wavelengths — in the absorption band of the absorbing gas and in a reference window, respectively. By comparing the two measured intensities, the amount of the absorbing gas above the cloud top is determined; consequently, the height of the cloud top is determined. Measurements in and outside of the 0.76 absorption band of oxygen are considered appropriate. The effect of different solar zenith angles should be considered. Also, corrections due to the backscattering of clouds should be checked.

REFERENCES:

R. A. Hanel. Determination of Cloud Altitude Form A Satellite. J. Geophys, Res., 66, 1961.

G. Yamamoto and D. Q. Wark. Discussion of the letter by R. A. Hanel, Determination of Cloud Altitude Form A Satellite. J. Geophys. Res., 66, 1961.

TASK PARAMETERS

NO. 83801 TITLE Measurement – Height of Cloud Tops

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 753

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85801 through 85804, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 839 TITLE Measurements of Cloud Types, Patterns, and Cover for Analysis of Supercooled Clouds

LEVEL Measurements

DESCRIPTION

Same as Task No. 804.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable(A): High-Latitude Orbit

Accuracy

D: None

A: None

Horizontal Resolution

D: 1 mi

A: 5 mi

Vertical Resolution

D: 1,000 ft

A: 5,000 ft

Dynamic Range of Value

Identify form

JUSTIFICATION

This task will determine the cloud types and to apply this information to the meteorological phenomena of supercooled clouds.

Technique

The technique planned will analyze the television or IR pictures for cloud patterns and cloud type and measure the extent and amount of cover.

The television systems would be used to observe the cloud field on the sunlit side of the orbit, while the infrared system would observe the cloud field in the dark side of the orbit. To enhance cloud details, surface features, etc., on the sunlit side, a color television system may prove superior to a black and white system.

If the image contrast and resolution of the IR and television pictures are of sufficient quality, then the pictures could have a nonmeteorological application as well (such as iceberg survey, etc.).

TASK PARAMETERS

NO. 839 TITLE Measurement – Cloud Types and Patterns

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 768, 769

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85801 through 85804, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0
1	71	1.5	0

ELECTRICAL POWER 280 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
19	Camera

TASK NO. 840 TITLE Measurements of Thermal Radiation for a Radiation Balance

LEVEL Measurements

DESCRIPTION

Same as Task No. 817.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit

Acceptable (A): High-Latitude Orbit

Accuracy

D: 0.1%

A: 1.0%

Horizontal Resolution

D: $(100 \text{ mi})^2$

A: $(300 \text{ mi})^2$

Vertical Resolution

D: <1,000 ft

A: <5,000 ft

Dynamic Range of Value

0-10 cal/sq cm/min. (0-10 ly/min.)

JUSTIFICATION

The earth and atmospheric distribution of thermal radiation is required for the various meteorological analyses of the Earth atmosphere radiation balance.

Technique

The thermal outgoing radiation is due to blackbody emission from the ground surface of the earth or cloud tops and the effect of atmospheric gases on this radiation. This radiation effect results in absorption and emission of radiation by the atmospheric gases in the spectral region where the absorption bands are present. Another factor influencing the outgoing thermal radiation is the emissivity of ground surface. This factor is around unity in the infrared region of spectrum and varies according to the characteristics of the ground surface. Atmospheric aerosols also have been noticed to attenuate the outgoing infrared radiation. The thermal radiation is measured directly in a wide spectral bandwidth of 8 to 30 μ.

In this case a conversion of the measured radiation into an atmospheric parameter such as pressure or temperature does not have to be made. Therefore, the whole procedure is much simpler. The proper filters and the calibration must be carefully chosen. One of the channels of Tiros meteorological satellites has measured the thermal radiation. (References 1 and 2).

REFERENCES

1. R. A. Hanel and W. G. Stroud. The Tiros II Radiation Experiment. NASA TND-1152, 1961

2. W. Viezee and P. A. Davis. Analysis and Interpretation of Daytime Radiation Data from Tiros III, Orbit A. Stanford Research Institute, AFCRL-64-34, 1964.

TASK PARAMETERS

NO. 840 TITLE Measurements – Thermal Radiation

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257, 754

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85901, 0 hr; 85902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 290 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer

TASK NO. 841 TITLE Measurements of Backscattered Solar Radiation for a Radiation Balance

LEVEL Measurements

DESCRIPTION

Same as Task No. 818.

MEASUREMENT PERFORMANCE SPECIFICATIONS:

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 0.1%
A: 1.0%

Horizontal Resolution

D: $(100\ \text{mi})^2$
A: $(300\ \text{mi})^2$

Vertical Resolution

D: - N/A
A: - N/A

Dynamic Range of Value

0-10 cal/sq cm/min. (0-2 ly/min.)

JUSTIFICATION

The purpose of this task is to determine the amount of solar backscattered radiation and to apply this information in the various analyses required to obtain an Earth-atmospheric radiation balance.

Technique

The solar incoming radiation is scattered by the molecular atmosphere, aerosols, and clouds. The backscattered solar radiation depends on the solar zenith angle and the ground surface reflectivity. The intensity of the backscattered radiation increases with the increase of the optical thickness of the atmosphere. For small optical thickness, a singly scattered light will represent the backscattered solar radiation. For large optical thickness, the effect of higher-order scatterings should be considered. The backscattered solar radiation is obtained by direct measurements in the spectral bandwidth of 0.2 to 6μ.

In this case, a conversion of the measured radiation into an atmospheric parameter, such as pressure or temperature, does not have to be made. Therefore, the whole procedure is much simpler. Care must be taken in the calibration and in choice of the proper filters. One of the channels of Tiros meteorological satellites has measured the solar backscattered radiation (References 1 and 2).

REFERENCES

1. R.A. Hanel and W. G. Stroud. The Tiros II Radiation Experiment. NASA TND-1152, 1961.

2. W. Viezee and P.A. Davis. Analysis and Interration of Daytime Institute. AFCRL-64-34, 1964.

TASK PARAMETERS

NO. 841 TITLE Measurement Solar Backscatter Radiation

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 758

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85901, 0 hr; 85902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 190 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
21	Visible Radiometer

TASK NO. 84202 (842-2) TITLE Measurements of Atmospheric Ozone for a Radiation Balance

LEVEL Measurements

DESCRIPTION

Same as Task No. 80502 (805-2)

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 5%
A: 10%

Horizontal Resolution

D: $(150\ \text{mi})^2$
A: $(300\ \text{mi})^2$

Vertical Resolution

D: <1,000 ft
A: <5,000 ft

Dynamic Range of Value

0 to 1 cm STP
(0-20 μg, 1 Kg)

JUSTIFICATION

This task is required to determine the vertical distribution and total amount of ozone in an atmospheric column in order to apply this information for the determination of an Earth-atmospheric radiation balance.

Technique

The proposed technique is to measure backscattered ultraviolet solar radiation in the Hartley absorption band of 2,200 to 3,200 Å. In the center of the absorption band, the backscattered solar radiation originates from upper layers (above 40 km). This is due to the fact that the scattered ultraviolet radiation in the lower layers is absorbed by the upper atmosphere due to strong ozone absorption present in this spectrum region. In the wing of absorption band (about 3,000 Å), the radiation received is from above 12 km (stratosphere). Therefore, the radiation observed at different wavelengths in the Hartley absorption band corresponds to the solar backscattered ultraviolet radiation emerging from above different heights, depending on amount and distribution of ozone in the atmosphere.

The theoretical work considers scattering by a molecular atmosphere and absorption by ozone. The ultraviolet backscattered solar radiation is obtained by solving the appropriate equation of the radiative transfer. A comparison of measurements of the ultraviolet solar backscattered radiation at different wavelengths in the Hartley absorption band of ozone with theoretical computations will result in data on the vertical distribution and the total amount of ozone present in the upper atmosphere.

The effect of aerosols and horizontal nonuniformity are not considered in this method. In addition, consideration must be given to the effect of tropospheric scattering, which depends on the solar zenith angle, and the scattering due to the presence of clouds and the aerosols which is not sufficiently known.

REFERENCES

1. S. F. Singer and R. C. Wentworth. A Method for the Determination of the Vertical Ozone Distribution from a Satellite. J. Geophys. Res., 62, 1957.

2. S. Twomey. On the Deduction of Vertical Distribution of Ozone by Ultraviolet Spectral Measurements from a Satellite. J. Geophys. Res., 66, 1961.

3. A. Sekera and D. Sekera. Determination of the Vertical Distribution of Ozone from the Measurements of Diffusely Reflected Ultraviolet Solar Radiation. Planetary Space Sci., 5, 1961.

TASK PARAMETERS

NO. 84202 TITLE Measurements – Ozone

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 761

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85901, 0 hr; 85902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2	0

ELECTRICAL POWER 186 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
20	UV Spectrometer

TASK NO. 843 TITLE Measurements of Backscattered Solar Radiation for Albedo

LEVEL Measurements

DESCRIPTION

Same as for Task No. 818

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 0.1%
A: 1.0%

Horizontal Resolution

D: $(100\ \text{mi})^2$
A: $(300\ \text{mi})^2$

Vertical Resolution

D: - N/A
A: - N/A

Dynamic Range of Value

0-2 cal/sq cm/min. (0-2 ly/min.)

JUSTIFICATION

This task is required to determine the amount of solar backscattered radiation and to apply this information in the various analyses of the meteorological phenomena of albedo.

Technique

The solar incoming radiation is scattered by the molecular atmosphere, aerosols, and clouds. The backscattered solar radiation depends on the solar zenith angle and the ground surface reflectivity. The intensity of the backscattered radiation increases with the increase of the optical thickness of the atmosphere. For small optical thickness, a single scattered light will represent the backscattered solar radiation. For large optical thickness, the effect of higher-order scatterings should be considered. The backscattered solar radiation is obtained by direct measurements in the spectral bandwidth of 0.2 to 6μ.

In this case, conversion of the measured radiation into an atmospheric parameter, such as pressure or temperature does not have to be made. Therefore, the whole procedure is much simpler. Care must be observed in the calibration and in choice of the proper filters. One of the channels of Tiros meteorological satellites has measured the solar backscattered radiation (References 1 and 2).

REFERENCES

1. R. A. Haneland W. G. Stroud. The Tiros II Radiation Experiment. NASA TND-1152, 1961.

2. W. Viezee and P. A. Davis. Analysis and Interration of Daytime Institute. AFCRL-64-34, 1964.

TASK PARAMETERS

NO. 843 TITLE Measurements — Albedo

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 758

SUCCESSOR TASK NO. AND INITIAL LAG TIME 86001, 0 hr; 86002, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 190 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
21	Visible Radiometer

TASK NO. 84401 (844-1) TITLE Measurement of Cloud-Top Height for Atmospheric Electricity

LEVEL Measurements

DESCRIPTION

Same as Task No. 80901.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 500 ft
A: 4,000 ft

Horizontal Resolution

D: $(1\ \text{mi})^2$
A: $(20\ \text{mi})^2$

Vertical Resolution

D: 500 ft
A: 1,000 ft

Dynamic Range of Value

0 to 80,000 ft MSL

JUSTIFICATION

The purpose of this task is to determine the height of cloud tops and to apply this information to the meteorological phenomena of atmospheric electricity.

Technique

The proposed technique is to determine the total amount of gas present in the atmosphere above the top of a cloud by measuring the absorption of the radiation in the corresponding absorption band. In this method, the radiation is measured in two different wavelengths in the absorption band of the absorbing gas and in a reference window respectively. By comparing the two measured intensities, the amount of the absorbing gas above the cloud top is determined; consequently, the height of the cloud top is determined. Measurements in and outside of the 0.76 absorption band of oxygen are considered to be appropriate. The effect of different solar zenith angles should be taken into consideration. Also corrections due to the backscattering of clouds should be checked.

REFERENCES

1. R. A. Hanel. Determination of Cloud Altitude From A Satellite. J. Geophys. Res., 66, 1961.

2. G. Yamamoto and D. Q. Wark. Discussion of the letter by R. A. Hanel, Determination of Cloud Altitude Form A Satellite. J. Geophys. Res., 66, 1961.

TASK PARAMETERS

NO. 84401 TITLE Measurement — Height of Cloud Tops

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 3

PREDECESSOR TASK NO. 753

SUCCESSOR TASK NO. AND INITIAL LAG TIME 861, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
12	Microwave Radiometer

TASK NO. 845 TITLE Measurements of Cloud-Top and Ground-Surface Temperatures for Atmospheric Electricity

LEVEL Measurements

DESCRIPTION

Same as Task No. 837.

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 0.5°C
A: 1.0°C

Horizontal Resolution

D: $(1\text{ mi})^2$
A: $(20\text{ mi})^2$

Vertical Resolution

D: <500 ft
A: <1,000 ft

Dynamic Range of Value

-100°C to +30°C

JUSTIFICATION

This task is required to determine the cloud-top temperature and to apply this information to the meteorological phenomena of atmospheric electricity.

Technique

The thermal outgoing radiation is due to blackbody emission of ground surface of the earth or cloud tops. This radiation effect results in absorption and emission of radiation by atmospheric gases in the spectral region where the absorption bands are present. Measurements of radiation in the atmospheric window of 10-12μ correspond to the ground surface of cloud top emitted radiation. Therefore, by assuming blackbody radiation according to Planck's law, surface or cloud-top temperatures can be determined. However, to obtain better estimates for the surface or cloud top temperatures, corrections should be made considering the influence of water vapor and ozone on the emitted radiation in the atmospheric window of 10-12μ. (Reference 1) The measured infrared radiation depends also on the surface emissivity which deviates from unity, depending on the kind of the surface. Corrections due to this effect should be also considered in determining surface temperatures. Determination of cloud-top temperatures and access to the temperature sounding provide an estimate to the height of cloud tops.

To eliminate the interference of water vapor and ozone on the emitted radiation, infrared measuring instruments have been developed with a detector 7 cm^{-1} wide located in the 11.1 micron "window." (Reference 2) Correction due to surface emissivity will still have to be applied.

A manned orbital research program would permit several experiments to be conducted simultaneously to compare these advantages and disadvantages.

REFERENCES

1. D. Q. Wark, G. Yamamoto, and J. H. Lienesch. Methods of Estimating Infrared Flux and Surface Temperature from Meteorological Satellites. Journal of the Atmospheric Sciences, 19, 1962.

2. R. H. Hanel and D. Q. Wark. Physical Measurements from Meteorological Satellites. Astronautics and Aerospace Engineering, 3 April 1963, pp. 85-88.

TASK PARAMETERS

NO. 845 TITLE Measurement - Cloud Top Temperature

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 360 NO. OF CYCLES 3

PREDECESSOR TASK NO. 257

SUCCESSOR TASK NO. AND INITIAL LAG TIME 861, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 180 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer

TASK NO. 846 TITLE Measurements of Phase of Cloud Hydrometeors for Atmospheric Electricity

LEVEL Measurements

DESCRIPTION

Same as for Task No. 836

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 1%
A: 10%

Horizontal Resolution

D: $(1 \text{ mi})^2$
A: $(20 \text{ mi})^2$

Vertical Resolution

D: 500 ft
A: 1,000 ft

Dynamic Range of Value

0 to 100% Ice (Liquid)

JUSTIFICATION

The purpose of this task is to determine the phase of cloud hydrometeors and to apply this information in the various analysis of meteorological phenomena of atmospheric electricity.

Technique

Intensity and polarization measurements in the visible and near-infrared region of the backscattered solar radiation from the top of a cloud will depend on the concentration and size distribution of the hydrometeors present in the cloud. Proper care should be taken to include the effect of solar zenith angle on the backscattered radiation measurements. The water vapor absorption also affects the backscattered radiation measurements, although this absorption effect is not very strong in the visible and near-infrared region of spectrum. The theory of such a study should include higher order scattering effects on the reflected radiation, since these effects are very strong for thick clouds. In principle, the concentration and size distribution of hydrometeors can be obtained by measuring intensity and polarization of backscattered solar radiation at several wavelengths in the visible and near-infrared region of spectrum. Information as to the cloud-top temperature and height, and cloud pictures, combined with the results of polarimetric measurements will be useful in determining the type and the physical processes involved in a cloud.

A manned orbital research program makes it possible to obtain information simultaneously about different parameters such as temperature, intensity, and polarization of backscattered solar radiation, etc., which will be useful in a meteorological phenomenon study such as clouds.

REFERENCES

1. D. Deirmendjian. Scattering and Polarization Properties of Polydispersed Suspensions with Partiial Absorption. Rand Corporation Report No. RM-3228-PR, 1962.

2. E. W. Hewson. The Reflection, Absorption, and Transmission of Solar Radiation by Fog and Cloud. Quarterly Journal of Royal Meteorological Society, 69, 1943.

TASK PARAMETERS

NO. 846 TITLE Measurement - Phase of Cloud Hydrometeors

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 6

PREDECESSOR TASK NO. 760

SUCCESSOR TASK NO. AND INITIAL LAG TIME 861, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 170 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
23	Visible Polarimeter

TASK NO. 847 TITLE Measurements of Atmospheric Electrical Disturbances due to Thunderstorms and Tornadoes

LEVEL Measurements

DESCRIPTION

This task description applies to a directional sferics receiver that will be used to detect atmospheric electrical disturbances.

1. Preparation for observation.

   A. Select proper components for experiment; optical, power supply, etc.
   B. Visually inspect instrument for defects.
   C. Mount instrument. An astronaut may be needed to mount an antenna outside the spacecraft.
   D. Connect all electronics.
   E. Turn on electrical power to warm up electronics.
   F. Prepare recorders for measurements (install new tapes, check operation of recording equipment, etc.)
   G. Perform instrument calibration.
   H. Perform calibration of subcomponents periodically (check or recalibrate detectors characteristics, etc.).
   I. Preventative maintenance on instruments.
   J. Repair instruments.

2. Make observations.

   Besides performing the standard observations, the meteorological astronaut should tape his comments about unusual events. The events may be non-meteorological.

3. Record and store data and related parameters.

   A. Related parameters must be properly identified with the data. This can be done with a registration counter.
   B. Some of the related parameters are as follows:

      (1) Orbit number.
      (2) Orbit coordinates.
      (3) Orbital altitude.
      (4) Date and time of day.
      (5) Nadir angle of observation.
      (6) Azimuth angle of observation.
      (7) Sun elevation.
      (8) Instrument identification.
      (9) TV picture with geographical grid.
      (10) Geographic location to which instrument is pointing.
      (11) Registration counter number.

4. Monitor data for quality.

   A. This may require ground-base confirmation of observations at specific geographical locations and time.
   B. Repeat calibration to ensure against changes of equipment performance.

5. Monitor system operation.

   A. Check electrical power (voltage and current) supplied to instrument.
   B. Check and adjust frequency regulator as applicable.
   C. Check recording equipment to ensure that all the related data are being recorded and properly indexed.

6. Perform special observations.

   This may involve making simultaneous observations with other instruments (voice recording of special events, photographing points of interest, etc.).

7. Prepare data for transmission.

   This will involve preparing the tapes with data for readout at a given time. It may also involve preliminary data reduction and/or analysis by the astronaut prior to transmission.

MEASUREMENT PERFORMANCE SPECIFICATIONS

<u>Type of Orbit</u>

Desired (D): Synchronous Orbit
Acceptable (A): 1. High-Latitude Orbit
2. Polar Orbit

<u>Accuracy</u>

D: 1%
A: 5%

<u>Horizontal Resolution</u>

D: $(2\ \text{mi})^2$
A: $(5\ \text{mi})^2$

<u>Vertical Resolution</u>

D: 1,000 ft
A: 4,000 ft

<u>Dynamic Range of Value</u>

Events: 1 every 10 min. to 1 every sec

JUSTIFICATION

This task is required to detect atmospheric electrical disturbances and to apply this information in the various analyses of the meteorological phenomena of thunderstorms and tornadoes.

Technique

Sferics is the measurement of RF emissions by lightning. To detect sferics it has been suggested that a simple receiver of fairly broad bandpass (probably in the vicinity of 100 mc/s), and with an antenna pattern encompassing the entire visible Earth, be used.

The detection and mapping of sferics could be an important contribution to meteorology by indicating areas of strong vertical motions related to tropical storms development and to other violent phenomena bearing on strong winds, heavy rainfall, and turbulence.

REFERENCE

R. A. Hanel and D. Q. Wark. Physical Measurements from Meteorological Satellites. Astronautics and Aerospace Engineering. April 1963.

TASK PARAMETERS

NO. 847 TITLE Measurements - Atmospheric Electrical Disturbances

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 773

SUCCESSOR TASK NO. AND INITIAL LAG TIME 85701 through 85709, 0hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 133 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
22	Directional Sferics Receiver

TASK NO. 848 TITLE Measurements of Atmospheric Electrical Disturbances to Determine Amount of Atmospheric Electricity

LEVEL Measurements

DESCRIPTION

Same as for Task No. 847

MEASUREMENT PERFORMANCE SPECIFICATIONS

Type of Orbit

Desired (D): Polar Orbit
Acceptable (A): High-Latitude Orbit

Accuracy

D: 1%
A: 5%

Horizontal Resolution

D: $(2\ \text{mi})^2$
A: $(5\ \text{mi})^2$

Vertical Resolution

D: 1,000 ft
A: 4,000 ft

Dynamic Range of Value

Event: 1 every 10 min. to
1 every sec

JUSTIFICATION

This task is required to detect atmospheric electrical disturbances and to apply this information in the various analyses of the meteorological phenomena of atmospheric electricity.

Technique

Sferics is the measurement of rf emissions by lightning. To detect sferics it has been suggested that a simple receiver of fairly broad bandpass (probably in the vicinity of 100 mc/s with an antenna pattern encompassing the entire visible Earth) be used.

The detection and mapping of sferics could be an important contribution to meteorology by indicating areas of strong vertical motions related to tropical storms development and to other violent phenomena bearing on strong winds, heavy rainfall, and turbulence.

REFERENCE

R. A. Hanel and D. Q. Wark. Physical Measurements from Meteorological Satellites. Astronautics and Aerospace Engineering, April 1963.

TASK PARAMETERS

NO. 848 TITLE Measurements - Atmospheric Electrical Disturbance

INTERRUPTIBLE Yes DURATION (HR) 8 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 240 NO. OF CYCLES 3

PREDECESSOR TASK NO. 773

SUCCESSOR TASK NO. AND INITIAL LAG TIME 861, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1.5	0

ELECTRICAL POWER 133 W 8 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
22	Directional Sferics Receiver

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TASK NO. 85101 (851-1) TITLE Monitor Planetary Scale Circulation for Long-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for changes in the long wave pattern.

2. Phenomenon Definition.

The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

The change in the long wave pattern is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these changes, which presage a change in the circulation regime; for example, from a sluggish to a more rapid movement of migratory anticyclones and cyclones, or vise versa.

JUSTIFICATION

Planetary scale circulation is a phenomenon that is useful in long-range weather forecast for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85101 TITLE Monitor Planetary Scale Circulation

INTERRUPTIBLE Yes DURATION (HR) 0.67 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 80101, 802, 80301, 804, 80502, 80105

SUCCESSOR TASK NO. AND INITIAL LAG TIME 901, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.33	0.33
1	66	0.33	0.33
1	71	0.33	0.33

ELECTRICAL POWER 2,593 W 0.67 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer

TASK NO. 85102 (851-2) TITLE Monitor Planetary Scale Circulation for Long-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for changes in the long wave pattern.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The change in the long wave pattern is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these changes; which presage a change in the circulation regime; for example, from a sluggish to a more rapid movement of migratory anticyclones and cyclones or vise-versa.

JUSTIFICATION

Planetary scale circulation is a phenomenon that is useful in long-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85102 TITLE Monitor Planetary Scale Circulation

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 80101, 80105, 802, 80301, 804, 80502

SUCCESSOR TASK NO. AND INITIAL LAG TIME 905, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0.333
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,593 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer

TASK NO. 85103 (851-3) TITLE Monitor Planetary Scale Circulation for Short-Range Forecasts of Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for changes in the long wave pattern.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The change in the long wave pattern is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting changes.

JUSTIFICATION

Planetary scale circulation is a phenomenon that is useful in determining the physical and synoptic climatology of surface and air pollution areas.

TASK PARAMETERS

NO. 85103 TITLE Monitor Planetary Scale Circulation

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5, 840

PREDECESSOR TASK NO. 80101, 80105, 802, 80301, 804, 80502

SUCCESSOR TASK NO. AND INITIAL LAG TIME 909, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333
1	72	0.333	0.333

ELECTRICAL POWER 2, 593 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer

TASK NO. 85104 (851-4) TITLE Monitor Planetary Scale Circulation for Physical and Synoptic Climatology for Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for determining the long wave pattern.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The change in wave number of the planetary scale circulations and the latitudinal shifting and strength of the westerlies follow a seasonal trend. The zonal and meridianal planetary scale circulations control the migration of cyclones and anticyclones and hence indirectly, the pollution potential of geographical areas.

JUSTIFICATION

Planetary scale circulation is a phenomenon that is useful in determining the physical and synoptic climatology of surface and air pollution areas.

TASK PARAMETERS

NO. 85104 TITLE Monitor Planetary Scale Circulation

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5, 840

PREDECESSOR TASK NO. 80101, 80105, 802, 80301, 804, 80502

SUCCESSOR TASK NO. AND INITIAL LAG TIME 910, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333
1	72	0.333	0.333

ELECTRICAL POWER 2, 593 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer

TASK NO. 85105 (851-5) TITLE Monitor Planetary Scale Circulation for Physical and Synoptic Climatology for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with a pair of binoculars, a telescope, or appropriate instrument sensors for determining the long wave pattern.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The change in wave number of the planetary scale circulations and the latitudinal shifting and strength of the westerlies follow a seasonal trend. The zonal and meridional planetary scale circulations control the migration of cyclones and anticyclones and hence, to a large extent, the weather over a particular area.

JUSTIFICATION

Planetary scale circulation is a useful phenomenon in determining the physical and synoptic climatology for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85105 TITLE Monitor Planetary Scale Circulation

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 80101, 80105, 802, 80301, 804, 80502

SUCCESSOR TASK NO. AND INITIAL LAG TIME 913, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333
1	72	0.333	0.333

ELECTRICAL POWER 2,593 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer

TASK NO. 85201 (852-1) TITLE Monitor Tropical Vortices, Tropical Storms, and Hurricanes for Long-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are useful phenomena in making long-range weather forecasts of floods.

TASK PARAMETERS

NO. 85201 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 901, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85202 (852-2) TITLE Monitor Tropical Vortices, Tropical Storms, and Hurricanes for Short-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaisance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting their synoptic features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena which are useful in making short-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85202 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85203 (852-3) TITLE Monitor Tropical Vortices, Tropical Storms, and Hurricanes for Weather Modification for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful in effecting weather modification for flood, drought, and fire warning and control service.

TASK PARAMETERS

NO. 85203 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 903, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85204 (852-4) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Short-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful in making short-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85204 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 904, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85205 (852-5) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Long-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomenon useful for making long-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85205 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 905, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85205 (852-5) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Long-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomenon useful for making long-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85205 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 905, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85206 (852-6) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Weather Modification for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena which may be useful in effecting weather modification for agriculture.

TASK PARAMETERS

NO. 85206 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 906, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85207 (852-7) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Short-Range Forecasts of Severe Weather

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful in making short-range forecasts of severe weather.

TASK PARAMETERS

NO. 85207 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 907, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85208 (852-8) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Weather Modification for Severe Weather Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful for effecting weather modification for severe weather control.

TASK PARAMETERS

NO. 85208 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 908, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85209 (852-9) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Short-Range Weather Forecasts for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with a pair of binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful in making short-range weather forecasts for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85209 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 911, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 852010 (852-10) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Physical and Synoptic Climatology for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for tropical vortices, tropical storms, and hurricanes.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to establishing the typical trajectories and life cycles of tropical vortices, tropical storms, and hurricanes.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful in determining the physical and synoptic climatology for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 852010 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 913, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 852011 (852-11) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Weather Modification for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful in effecting weather modifications for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 852011 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 914, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 852012 (852-12) TITLE Monitor Tropical Vortices, Storms, and Hurricanes for Short-Range Weather Forecasts for Communications

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic features.

JUSTIFICATION

Tropical vortices, tropical storms, and hurricanes are phenomena useful for making short-range weather forecasts for communications.

TASK PARAMETERS

NO. 852012 TITLE Monitor Tropical Vortices

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 1,200

PREDECESSOR TASK NO. 808, 80901, 81001, 81005

SUCCESSOR TASK NO. AND INITIAL LAG TIME 915, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 507 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
15	IR Interferometer
19	Camera

TASK NO. 85301 (853-1) TITLE Monitor Extratropical Cyclone and Anticyclones for Long-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for locating stagnating and blocking anticyclones and cyclones.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. Stagnating and blocking anticyclones and cyclones are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in making long-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85301 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 901, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

TASK NO. 85302 (853-2) TITLE Monitor Extratropical Cyclones and Anticyclones for Short-Range Weather Forecasts for Flood. Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for locating stagnating and blocking anticyclones and cyclones.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in making short-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85302 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3.650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

TASK NO. 85303 (853-3) TITLE Monitor Extratropical Cyclones and Anticyclones for Short-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors to detect changes in the cyclones and anticyclones and their movements.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting changes in these synoptic features.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in making short-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85303 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 904, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

NO: 85304 (853-4) TITLE Monitor Extratropical Cyclones and Anticyclones for Long-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for locating stagnating and blocking anticyclones and cyclones.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. Stagnating and blocking anticyclones and cyclones are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in making long-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85304 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 905, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

TASK NO. 85305 (853-5) TITLE Monitor Extratropical Cyclones and Anticyclones for Short-Range Forecasts of Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for locating stagnating and blocking anticyclones and cyclones.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. Stagnating and blocking anticyclones and cyclones are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in making short-range forecasts of surface and air pollution.

TASK PARAMETERS

NO. 85305 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 909, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

TASK NO. 85306 (853-6)

TITLE Monitor Extratropical Cyclones and Anticyclones for Physical and Synoptic Climatology for Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for locating stagnating and blocking anticyclones and cyclones.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for establishing pollution potentials.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in determining the physical and synoptic climatology for surface and air pollution areas.

TASK PARAMETERS

NO. 85306 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 910, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

TASK NO. 85307 (853-7) TITLE Monitor Extratropical Cyclones and Anticyclones for Short-Range Weather Forecasts for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors to detect changes in the cyclones and anticyclones and their movements.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting changes in these synoptic features.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in making short-range weather forecasts for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85307 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 911, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Radiometer

TASK NO. 85308 (853-8) TITLE Monitor Extratropical Cyclones and Anticyclones for Physical and Synoptic Climatology for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for extratropical cyclones and anticyclones.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to establishing the typical trajectories and life cycles of anticyclones and cyclones.

JUSTIFICATION

Extratropical cyclones and anticyclones are phenomena useful in determining the physical and synoptic climatology for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85308 TITLE Monitor Extratropical Cyclones

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 811, 81201, 81205, 81301, 81402, 81501, 816, 817, 818

SUCCESSOR TASK NO. AND INITIAL LAG TIME 913, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167
1	72	0.167	0.167

ELECTRICAL POWER 2,751 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
19	Camera
21	Visible Polarimeter

TASK NO. 85401 (854-1) TITLE Monitor Jet Streams for Short-Range Weather Forecasts for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be Monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the jet streams.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The jet streams, where strong winds and turbulence will be encountered, are more likely to occur above certain geographical areas than others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting this synoptic weather feature.

JUSTIFICATION

Jet streams are useful parameters in making short-range weather forecasts for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85401 TITLE Monitor Jet Streams

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 819, 820, 82105, 82201

SUCCESSOR TASK NO. AND INITIAL LAG TIME 911, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 2,457 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85402 (854-2) TITLE Monitor Jet Streams for Physical and Synoptic Climatology for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for jet streams.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The jet streams, where strong winds and turbulence will be encountered, are more likely to occur above certain geographical areas than others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting this synoptic weather feature.

JUSTIFICATION

Jet streams are phenomena useful in determining the physical and synoptic climatology for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85402 TITLE Monitor Jet Streams

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 819, 820, 82105, 82201

SUCCESSOR TASK NO. AND INITIAL LAG TIME 913, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 2,457 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85501 (855-1) TITLE Monitor Fronts, Easterly Waves, and Squall Lines for Short-Range Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be Monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Fronts, easterly waves, and squall lines are useful phenomena for making short-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85501 TITLE Monitor Fronts and Squalls

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 823, 82401, 82501, 82505, 82601, 82701, 828, 82902

SUCCESSOR TASK NO. AND INITIAL LAG TIME 902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,537 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85502 (855-2) TITLE Monitor Fronts, Easterly Waves, and Squall Lines for Short-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be Monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensor until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Fronts, easterly waves and squall lines are phenomena useful for making short-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85502 TITLE Monitor Fronts and Squalls

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 823, 82401, 82501, 82505, 82601, 82701, 828, 82902

SUCCESSOR TASK NO. AND INITIAL LAG TIME 904, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25
1	72	0.25	0.25

ELECTRICAL POWER 2,537 W 1/2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85503 (855-3) TITLE Monitor Fronts, Easterly Waves, and Squall Lines for Short-Range Weather Forecasts of Severe Weather

LEVEL Phenomena to be Monitored

DESCRIPTION

1. Phenomenon Reconnaissance

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Fronts, easterly waves, and squall lines are useful parameters in making short-range forecasts of severe weather.

TASK PARAMETERS

NO. 85503 TITLE Monitor Fronts and Squalls

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 823, 82401, 82501, 82505, 82601, 82701, 828, 82902

SUCCESSOR TASK NO. AND INITIAL LAG TIME 907, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,537 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85504 (855-4) TITLE Monitor Fronts, Squall Lines, and Easterly Waves for Short-Range Forecasts of Surface and Air Pollution

LEVEL Phenomena to be Monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The fronts, squall lines, and easterly waves with the accompanying washing out of the atmosphere and/or changing of air masses, are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic weather features.

JUSTIFICATION

Fronts, squall lines, and easterly waves are phenomena useful in making short-range forecasts of surface and air pollution.

TASK PARAMETERS

NO. 85504 TITLE Monitor Fronts and Squalls

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 823, 82401, 82501, 82505, 82601, 82701, 828, 82902

SUCCESSOR TASK NO. AND INITIAL LAG TIME 909, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333
1	72	0.333	0.333

ELECTRICAL POWER 2,537 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85505 (855-5) TITLE Monitor Fronts, Squall Lines, and Easterly Waves for Physical and Synoptic Climatology for Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with a pair of binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. Fronts, squall lines, and easterly waves, accompanied by the "washing-out" of the atmosphere and/or changing of the air mass, are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for establishing pollution potentials.

JUSTIFICATION

Fronts, squall lines, and easterly waves are phenomena useful in determining the physical and synoptic climatology for surface and air pollution areas.

TASK PARAMETERS

NO. 85505 TITLE Monitor Fronts and Squalls

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 823, 82401, 82501, 82505, 82601, 82701, 828, 82902

SUCCESSOR TASK NO. AND INITIAL LAG TIME 910, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,537 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85506 (855-6) TITLE Monitor Fronts, Easterly Waves, and Squall Lines for Short-Range Weather Forecasts for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these synoptic features.

JUSTIFICATION

Fronts, easterly waves, and squall lines are phenomena useful in making short-range weather forecasts for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85506 TITLE Monitor Fronts and Squalls

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 823, 82401, 82501, 82505, 82601, 82701, 828, 82902

SUCCESSOR TASK NO. AND INITIAL LAG TIME 911, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333
1	72	0.333	0.333

ELECTRICAL POWER 2,537 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85601 (856-1) TITLE Monitor Atmospheric Structure and Motion Fields for Short Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which are conducive to flood, drought, and/or forest fire, are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Atmospheric structure and motion field are useful parameters in making short-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85601 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,377 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85602 (856-2) TITLE Monitor Atmospheric Structure and Motion Fields for Short-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with a pair of binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which can be damaging to crops are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting potentially damaging conditions.

JUSTIFICATION

Atmospheric structure and motion field are phenomena useful in making short-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85602 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 904, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 2,377 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85603 (856-3) TITLE Monitor Atmospheric Structure and Motion Fields for Short-Range Forecasts of Severe Weather

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which may be associated with incipient severe weather, are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Atmospheric structure and motion fields are phenomena useful in making short-range forecasts of severe weather.

TASK PARAMETERS

NO. 85603 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 907, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,377 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85604 (856-4) TITLE Monitor Atmospheric Structure and Motion Fields for Weather Modification for Severe Weather Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which may be associated with incipient severe weather, is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Atmospheric structure and motion fields are phenomena useful in effecting weather modification for severe weather control.

TASK PARAMETERS

NO. 85604 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 908, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 2,377 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85605 (856-5) TITLE Monitor Atmospheric Structure and Motion Fields for Short-Range Forecasts of Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which are associated with surface and air pollution are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Atmospheric structure and motion fields are phenomena useful in making short-range forecasts of surface and air pollution.

TASK PARAMETERS

NO. 85605 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 909, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167

ELECTRICAL POWER 2,377 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV Camera
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85606 (856-6) TITLE Monitor Atmospheric Structure and Motion Fields for Physical and Synoptic Climatology for Surface and Air Pollution

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance .

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field associated with pollution is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Atmospheric structure and motion fields are phenomena useful in determining the physical and synoptic climatology of surface and air pollution areas.

TASK PARAMETERS

NO. 85606 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 910, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167

ELECTRICAL POWER 2,377 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85607 (856-7) TITLE Monitor Atmospheric Structure and Motion Fields for Short Range Weather Forecasts for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be measured

DESCRIPTION

1. Phenomenon Reconnaissance.

The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which may be associated with severe winds, wind storms, and turbulence are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Atmospheric structure and motion fields are phenomena useful in making short-range weather forecasts for land, sea air, and aerospace transportation.

TASK PARAMETERS

NO. 85607 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 911, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25
1	71	0.25	0.25

ELECTRICAL POWER 2,377 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85608 (856-8) TITLE Monitor Atmospheric Structure and Motion Fields for Short-Range Weather Forecasts for Communications

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors for the particular atmospheric structure and motion field of interest.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The particular atmospheric structure and motion field which are conducive to communication interference are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these conditions.

JUSTIFICATION

Atmospheric structure and motion fields are phenomena useful in making short-range weather forecasts for communications.

TASK PARAMETERS

NO. 85608 TITLE Monitor Atmospheric Structure

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 83001, 83005, 83101, 83201, 833

SUCCESSOR TASK NO. AND INITIAL LAG TIME 915, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167

ELECTRICAL POWER 2,377 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera

TASK NO. 85701 (857-1) TITLE Monitor Thunderstorms and Tornadoes for Short-Range Weather Forecasts for Flood, Drought and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition .

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in making short-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85701 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 902, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85702 (857-2) TITLE Monitor Thunderstorms and Tornadoes for Weather Modification for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulation. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in effecting weather modification for flood, drought, and fire warning and control service.

TASK PARAMETERS

NO. 85702 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,930

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 903, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85703 (857-3) TITLE Monitor Thunderstorms and Tornadoes for Short-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in making short-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85703 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 904, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85704 (857-4) TITLE Monitor Thunderstorms and Tornadoes for Weather Modification for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in effecting weather modification for agriculture.

TASK PARAMETERS

NO. 85704 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 837

SUCCESSOR TASK NO. AND INITIAL LAG TIME 906, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85705 (857-5) TITLE Monitor Thunderstorms and Tornadoes for Short-Range Forecasts of Severe Weather

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in making short-range forecasts of severe weather.

TASK PARAMETERS

NO. 85705 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 837

SUCCESSOR TASK NO. AND INITIAL LAG TIME 907, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85706 (857-6) TITLE Monitor Thunderstorms and Tornadoes for Weather Modification for Severe Weather Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in effecting weather modification for severe weather control.

TASK PARAMETERS

NO. 85706 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 908, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85707 (857-7) TITLE Monitor Thunderstorms and Tornadoes for Short-Range Weather Forecasts for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristic, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena useful in making short-range weather forecasts for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85707 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 911, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85708 (857-8) TITLE Monitor Thunderstorms and Tornadoes for Weather Modification for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena which are useful in effecting weather modification for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85708 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 914, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 85709 (857-9) TITLE Monitor Thunderstorms and Tornadoes for Short-Range Weather Forecasts for Communications

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Thunderstorms and tornadoes are phenomena which are useful in making short-range weather forecasts for communications.

TASK PARAMETERS

NO. 85709 TITLE Monitor Thunderstorms and Tornadoes

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 834, 83501, 847

SUCCESSOR TASK NO. AND INITIAL LAG TIME 915, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 424 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver

TASK NO.	85801 (858-1)	TITLE	Monitor Supercooled Clouds for Weather Modification for Flood, Drought, and Fire Warning and Control
LEVEL	Phenomena to be monitored		

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Supercooled clouds are phenomena which give useful information in effecting weather modification for flood, drought, and fire warning and control service.

TASK PARAMETERS

NO. 85801 TITLE Monitor Supercooled Clouds

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 836, 837, 83801, 839

SUCCESSOR TASK NO. AND INITIAL LAG TIME 903, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25

ELECTRICAL POWER 461 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
23	Visible Polarimeter

TASK NO. 85802 (858-2) TITLE Monitor Supercooled Clouds for Weather Modification for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Supercooled clouds are phenomena useful for effecting weather modification for agriculture.

TASK PARAMETERS

NO. 85802 TITLE Monitor Supercooled Clouds

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) [illegible]5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 836, 837, 83801, 839

SUCCESSOR TASK NO. AND INITIAL LAG TIME 906, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167

ELECTRICAL POWER 461 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
23	Visible Polarimeter

TASK NO. 85803 (858-3) TITLE Monitor Supercooled Clouds for Weather Modification for Severe Weather Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Supercooled clouds are phenomena which give useful information for effecting weather modification for severe weather control.

TASK PARAMETERS

NO. 85803 TITLE Monitor Supercooled Clouds

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 836, 837, 83801, 839

SUCCESSOR TASK NO. AND INITIAL LAG TIME 908, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333

ELECTRICAL POWER 461 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
23	Visible Polarimeter

TASK NO. 85804 (858-4) TITLE Monitor Supercooled Clouds for Weather Modification for Land, Sea, Air, and Aerospace Transportation

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon is more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting anomalous signals.

JUSTIFICATION

Supercooled clouds are phenomena useful in effecting weather modification for land, sea, air, and aerospace transportation.

TASK PARAMETERS

NO. 85804 TITLE Monitor Supercooled Clouds

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 836, 837, 83801, 839

SUCCESSOR TASK NO. AND INITIAL LAG TIME 914, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0.25

ELECTRICAL POWER 461 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
23	Visible Polarimeter

TASK NO. 85901 (859-1) TITLE Monitor Radiation Balance for Long-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with appropriate instrument sensors.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon will vary in intensity with the geographical area because of ground characteristics, topographical features, and prevailing atmospheric circulations and conditions. Particular attention should be given to the regions showing marked deviations from the normal.

JUSTIFICATION

A radiation balance gives useful information in making long-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 85901 TITLE Monitor Radiation Balance

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 840, 841, 84202

SUCCESSOR TASK NO. AND INITIAL LAG TIME 901, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 783 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
20	UV Spectrometer
21	Visible Radiometer

TASK NO. 85902 (859-2) TITLE Monitor Radiation Balance for Long-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with appropriate instrument sensors.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon will vary in intensity with the geographical area because of ground characteristics, topographical features, and prevailing atmospheric circulations and conditions. Particular attention should be given to the regions showing marked deviations from the normal.

JUSTIFICATION

A radiation balance gives useful information in making long-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 85902 TITLE Monitor Radiation Balance

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 840, 841, 84202

SUCCESSOR TASK NO. AND INITIAL LAG TIME 905, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333
1	71	0.333	0.333

ELECTRICAL POWER 783 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
20	UV Spectrometer
21	Visible Polarimeter

TASK NO. 86001 (860-1) TITLE Monitor Albedo for Long-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with appropriate instrument sensors.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon will vary in intensity with the geographical area because of ground characteristics, topographical features, and prevailing atmospheric circulations and conditions. Particular attention should be given to the regions showing marked deviations from the normal.

JUSTIFICATION

Albedo is a phenomenon which is useful in making long-range weather forecasts for flood, drought, and fire warning and control.

TASK PARAMETERS

NO. 86001 TITLE Monitor Albedo

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 843

SUCCESSOR TASK NO. AND INITIAL LAG TIME 901, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333

ELECTRICAL POWER 591 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
19	Camera
20	Visible Radiometer

TASK NO. 86002 (860-2) TITLE Monitor Albedo for Long-Range Weather Forecasts for Agriculture

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with appropriate instrument sensors.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The phenomenon will vary in intensity with the geographical area because of ground characteristics, topographical features, and prevailing atmospheric circulations and conditions. Particular attention should be given to the regions showing marked deviations from the normal.

JUSTIFICATION

Albedo is a phenomenon which is useful in making long-range weather forecasts for agriculture.

TASK PARAMETERS

NO. 86002 TITLE Monitor Albedo

INTERRUPTIBLE Yes DURATION (HR) 0.667 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 843

SUCCESSOR TASK NO. AND INITIAL LAG TIME 905, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.333	0.333

ELECTRICAL POWER 591 W 0.667 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
19	Camera
20	Visible Radiometer

TASK NO. 861 TITLE Monitor Atmospheric Electricity for Short-Range Weather Forecasts for Communications

LEVEL Phenomena to be monitored

DESCRIPTION

1. Phenomenon Reconnaissance.

   The field of view will be continuously reconnoitered with binoculars, a telescope, or appropriate instrument sensors until the phenomenon is detected.

2. Phenomenon Definition.

   The location, areal extent, intensity, and other characteristics of the phenomenon will be preliminarily defined in preparation for monitoring.

3. The atmospheric electrical conditions conducive to communication interference are more likely to occur in certain geographical areas than in others because of ground characteristics, topographical features, and prevailing atmospheric circulations. Particular attention should be given to these specific regions for detecting these conditions.

JUSTIFICATION

Atmospheric electricity is a phenomenon which is useful in making short-range weather forecasts for communications.

TASK PARAMETERS

NO. 861 TITLE Monitor Atmospheric Electricity

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 2,920

PREDECESSOR TASK NO. 84401, 845, 846, 848

SUCCESSOR TASK NO. AND INITIAL LAG TIME 915, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.167	0.167
1	71	0.167	0.167

ELECTRICAL POWER 464 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
19	Camera
22	Directional Sferics Receiver
23	Visible Polarimeter

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TASK NO. 901 TITLE Long-Range Weather Forecasting for Flood, Drought, and Fire Warning and Control

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground-based long-range weather forecaster to improve flood, drought, and fire warning and control service. He will check the current weather map analysis in doubtful areas with otherwise unavailable current ovservations; alert the forecaster to incipient adverse weather formations or to sudden changes in existing ones; and monitor the weather forecast map with current global observations for significant deviations.

JUSTIFICATION

Assistance in the preparation of the long-range weather forecast should improve the flood, drought, and fire warning and control service.

TASK PARAMETERS

NO. 901 TITLE Long-Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 85101, 85201, 85301, 85901, 86001

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,864 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer
21	Visible Radiometer

TASK NO. 902 TITLE Short-Range Weather Forecasts for Flood, Drought, and Fire Warning and Control

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based short-range weather forecaster to improve flood, drought, and fire warning and control service. This will be accomplished by checking the current weather map analysis in doubtful areas with otherwise unavailable current observations, by alerting the forecaster to incipient adverse weather formations or to sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations.

In exceptional cases, when the gravity of the situation warrants the action, the spacecraft meteorologist will bypass the ground based central meteorologist and issue the adverse weather warning directly to the interested party, who may not otherwise suspect an imminent personal hazard or loss. The spacecraft meteorologist may also advise on the meteorological control potential of the flood, drought, or fire.

JUSTIFICATION

Assistance in the preparation of short-range weather forecast should improve the flood, drought, and fire warning and control service.

TASK PARAMETERS

NO. 902 TITLE Short-Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3650

PREDECESSOR TASK NO. 85202, 85302, 85501, 85601, 85701

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2851 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
21	Visible Radiometer
22	Directional Sferics Receiver

TASK NO. 903 TITLE Weather Modifications for Flood, Drought, and Fire Warning and Control

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist may inspect the data or perform quick analyses of the data to advise the ground based weather modifiers and meteorologists whether atmospheric conditions are favorable at the moment for weather modification for flood, drought, or fire control in a particular area confronted by these problems.

In exceptional cases, when the gravity of the situation warrants the action, the spacecraft meteorologist may bypass the ground based meteorologists and issue weather modification directions directly to the weather control center. He may report on the effects of the weather modification activity. The spacecraft meteorologist is to assist the ground based weather-modifiers by checking the current weather map analysis in doubtful areas, by alerting the ground based meteorologist to incipient weather formations or sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations. The spacecraft meteorologist may also advise on the necessity of a flood, drought, or fire warning.

JUSTIFICATION

Weather modification assistance will be useful in the flood, drought, and fire warning and control service.

TASK PARAMETERS

NO. 903 TITLE Weather Modifications

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3650

PREDECESSOR TASK NO. 85203, 85702, 85801

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.25	0
1	66	0.25	0
1	71	0.25	0

ELECTRICAL POWER 491 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	Television System
11	IR Radiometer
15	IR Interferometer
17	IR Polarimeter
19	Camera
22	Directional Sferics Receiver

TASK NO. 904 TITLE Short-Range Weather Forecasts for Agriculture

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based short-range weather forecaster to improve his agricultural forecast service. He will do this by checking the current weather analysis in doubtful areas with otherwise unavailable current observations, by alerting the forecaster to incipient adverse weather formations or to sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations.

The spacecraft meteorologist may also issue a special warning in case of incipient meteorological conditions which could damage crops.

JUSTIFICATION

Assistance in the preparation of the short-range weather forecast should improve the forecast for agriculture.

TASK PARAMETERS

NO. 904 TITLE Short Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 85204, 85303, 85502, 85602, 85703

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.25	0
2	66	0.25	0
1	71	0.25	0

ELECTRICAL POWER 2,845 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
17	IR Polarimeter
19	Camera
21	Visible Radiometer
22	Directional Sferics Receiver

TASK NO. 905 TITLE Long-Range Weather Forecasts for Agriculture

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based, long-range weather forecaster to improve his agricultural forecasting service. He will do this by checking the current weather analysis in doubtful areas with otherwise unavailable current observations, by alerting the forecaster to incipient adverse weather formations or to sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations.

JUSTIFICATION

Assistance in the preparation of the long-range weather forecast should improve the forecast for agriculture.

TASK PARAMETERS

NO. 905 TITLE Long-Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5840

PREDECESSOR TASK NO. 85102, 85205, 85304, 85902, 86002

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,864 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer
21	Visible Radiometer

TASK NO. 906 TITLE Weather Modifications for Agriculture

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist may inspect the data or perform quick analyses of the data to advise the ground based weather modifiers and meteorologist whether atmospheric conditions are favorable at the moment for weather modification for the benefit of crop production in a particular area. He may report on the effects of the weather modification activity.

The spacecraft meteorologist is to assist the ground based weather modifiers by checking the current weather map analysis in doubtful areas, by alerting the ground based meteorologist to incipient weather formations or sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations.

JUSTIFICATION

Weather modification assistance will be useful to agriculture.

TASK PARAMETERS

NO. 906 TITLE Weather Modification

INTERRUPTIBLE Yes DURATION (HR) 0. 25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1. 5 NO. OF CYCLES 3,170

PREDECESSOR TASK NO. 85206, 85704, 85802

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0. 25	0
1	66	0. 25	0
1	71	0. 25	0

ELECTRICAL POWER 491 W 0. 25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
15	IR Interferometer
17	IR Polarimeter
19	Camera
22	Directional Sferics Receiver

TASK NO. 907 TITLE Short-Range Weather Forecast for Severe Weather Warning and Control

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based short-range weather forecaster improve his severe weather warning service. He will do this by checking the current weather map analysis in doubtful areas with otherwise unavailable current observations, by alerting the forecaster to incipient severe weather formations or to sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations.

In exceptional cases, when the gravity of the situation warrants the action, the spacecraft meteorologist will bypass the ground based central meteorologist and issue the severe weather warning directly to the pilot of an aircraft or watercraft, local meteorologist, or other interested party, who may not otherwise suspect an imminent personal hazard or disaster. The spacecraft meteorologist may also advise on severe weather.

JUSTIFICATION

Assistance in the preparation of the short-range weather forecast should improve the severe weather warning and control service.

TASK PARAMETERS

NO. 907 TITLE Short-Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3650

PREDECESSOR TASK NO. 85207, 85503, 85603, 85705

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,601 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
22	Directional Sferics Receiver

TASK NO. 908 TITLE Weather Modification for Severe Weather Warning and Control

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist may inspect the data or perform quick analyses of the data to advise the gound based weather modifiers and meteorologist whether atmospheric conditions are favorable at the moment for a particular type of weather modification in a particular area. He may report on the effects of the weather modification activity.

In exceptional cases, when the gravity of the situation warrants the action, the spacecraft meteorologist may bypass the ground based meteorologist and issue weather modification directions directly to the weather modifiers.

The meteorologist is to assist the ground based weather modifiers by checking the current weather map analysis in doubtful areas, by alerting the ground based meteorologist to incipient severe weather formation or sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations. The spacecraft meteorologist may also advise on the necessity of a severe weather warning.

JUSTIFICATION

Weather modification assistance will be useful in the severe weather warning and control service.

TASK PARAMETERS

NO. 908 TITLE Weather Modification

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 85208, 85604, 85706, 85803

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,521 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
13	Radar
14	Lidar
15	IR Interferometer
17	IR Polarimeter
19	Camera
22	Directional Sferics Receiver

TASK NO. 909 TITLE Short-Range Weather Forecasts of Surface and Air Pollution

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based short-range weather forecaster to improve his surface and air pollution forecast service. He will do this by checking the current weather analysis in doubtful areas with otherwise unavailable current observations, by altering the forecaster to incipient adverse weather formations or to sudden changes in existing ones, and by monitoring the weather forecast with current global observations for significant deviations.

In exceptional cases, when the gravity of the situation warrants the action, the spacecraft meteorologist will bypass the ground based central meteorologist and issue the adverse weather warning directly to the interested party who may not otherwise suspect an imminent personal hazard or loss. The spacecraft meteorologist may also advise on the meteorological control and hazard potential of the pollution.

JUSTIFICATION

Assistance in the preparation of the short-range weather forecast should improve surface and air pollution forecasting.

TASK PARAMETERS

NO. 909 TITLE Short-Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 85103, 85305, 85504, 85605

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,984 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer
21	Visible Radiometer

TASK NO. 910 TITLE Physical and Synoptic Climatology for Surface and Air Pollution

LEVEL Specific Application Area

DESCRIPTION

Meteorological data will be made available through special surveys to assist in establishing the physical and snyoptic macro-, meso-, and micro-climatology of a particular area. The information will be useful in determining the atmospheric capacity for dispersion of molecular and particulate pollutants and in controlling pollution for air conversion.

JUSTIFICATION

Assistance in establishing the physical and synoptic climatology of an area should improve the surface and air pollution survey and control.

TASK PARAMETERS

NO. 910 TITLE Physical and Synoptic Climatology

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 85104, 85306, 85505, 85606

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,963 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
20	UV Spectrometer
21	Visible Radiometer

TASK NO. 911 TITLE Short-Range Weather Forecasts for Transportation

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based short-range weather forecaster to improve his transportation forecast service. He will do this by checking the current weather map analysis in doubtful areas with otherwise unavailable current observations, by altering the forecaster to incipient adverse weather formations or to sudden changes in existing ones, and by monitoring the weather forecast map with global observations for significant deviations.

The spacecraft meteorologist may also issue a special warning in case of incipient meteorological conditions which could damage stationary or moving land-, sea-, air-, or aerospace-craft.

JUSTIFICATION

Assistance in the preparation of short-range weather forecast should improve the forecast for transportation.

TASK PARAMETERS

NO. 911 TITLE Short-Range Weather Forecasting

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3,650

PREDECESSOR TASK NO. 85209, 85307, 85401, 85506, 85607, 85707

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,851 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
19	Camera
21	Visible Radiometer
22	Directional Sferics Receiver

TASK NO. 913 TITLE Physical and Synoptic Climatology for Transportation

LEVEL Specific Application Area

DESCRIPTION

Meteorological data will be made available through special surveys to assist in establishing the physical and synoptic macro-, meso-, and micro-climatology of a particular geographical or atmospheric region. The information will be useful in design of land-, sea-, air-, and aerospace-craft and in their optimum operation for transportation.

JUSTIFICATION

Assistance in establishing the physical and synoptic climatology of a geographical or atmospheric region should improve land, sea, air and aerospace transportation.

TASK PARAMETERS

NO. 913 TITLE Physical and Synoptic Climatology

INTERRUPTIBLE Yes DURATION (HR) 0.333 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 85105, 852010, 85308, 85402

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.333	0
2	66	0.333	0
1	71	0.333	0

ELECTRICAL POWER 2,973 W 0.333 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
20	UV Spectrometer
21	Visible Radiometer

TASK NO. 914 TITLE Weather Modification for Transportation

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist may inspect the data or perform quick analyses of the data to advise the ground based weather modifiers and meteorologists whether atmospheric conditions are favorable at the moment for weather modification for the benefit of transportation in a particular area. He may report on the effects of the weather modification activity.

The spacecraft meteorologist is to assist the ground based weather modifiers by checking the current weather map analysis in doubtful areas, by alerting the ground based meteorologist to incipient weather formations or sudden changes in existing ones, and by monitoring the weather forecast map with current global observations for significant deviations.

JUSTIFICATION

Weather modification assistance will be useful for transportation.

TASK PARAMETERS

NO. 914 TITLE Weather Modification

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 3650

PREDECESSOR TASK NO. 852011, 85708, 85804

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.25	0
1	66	0.25	0
1	71	0.25	0

ELECTRICAL POWER 491 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
15	IR Interferometer
17	IR Polarimeter
19	Camera
22	Directional Sferics Receiver

TASK NO. 915 TITLE Short-Range Weather Forecasts for Communications

LEVEL Specific Application Area

DESCRIPTION

The spacecraft meteorologist will assist the ground based short-range weather forecaster to improve his forecast for communications. He will do this by checking the current weather analysis in doubtful areas with otherwise unavailable current observations, by alerting the forecaster to incipient adverse weather formations or to sudden changes in existing ones, and by monitoring the weather forecast map with global observations for significant deviations.

The spacecraft meteorologist may also issue a special warning in case of incipient meteorological conditions which could interrupt communications.

JUSTIFICATION

Assistance in the preparation of the short-range weather forecast should improve the forecast for communications.

TASK PARAMETERS

NO. 915 TITLE Short-Range Weather Modification

INTERRUPTIBLE Yes DURATION (HR) 0. 25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1. 5 NO. OF CYCLES 3,170

PREDECESSOR TASK NO. 852012, 85608, 85709, 861

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0. 25	0
2	66	0. 25	0
1	71	0. 25	0

ELECTRICAL POWER 2,577 W 0. 25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
10	TV System
11	IR Radiometer
12	Microwave Radiometer
13	Radar
14	Lidar
15	IR Interferometer
18	S-Band Polarimeter
22	Directional Sferics Receiver